



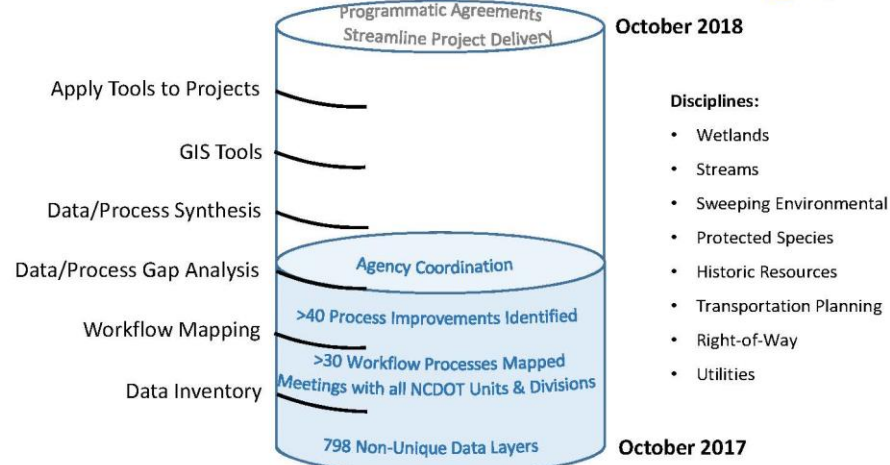
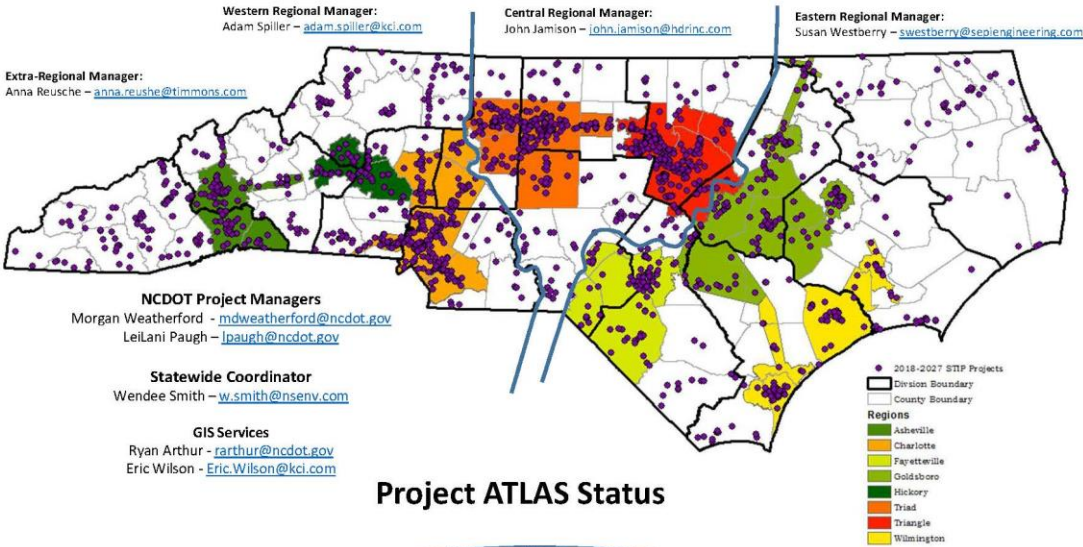
NCDOT Project ATLAS



Advancing Transportation through Linkages, Automation, and Screening

Project ATLAS Objectives:

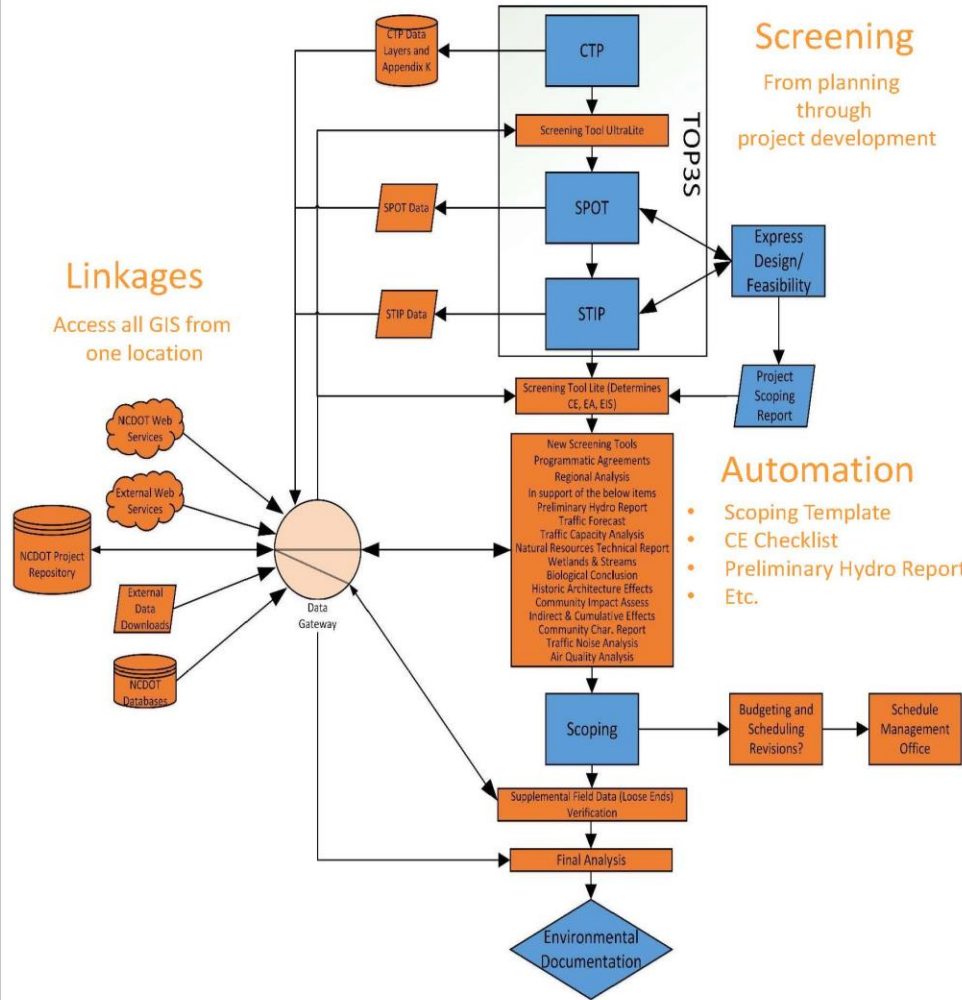
- Identify all data used to evaluate projects
- Improve data layers and create new layers where none exist
- Work with agencies to improve confidence in data
- Connecting data that is accessible to everyone
- Streamline project delivery by eliminating manual, repetitive tasks through automation
- Build GIS-based tools to evaluate projects on a regional-scale
- Generate automated reporting (ex. scoping templates, CE checklists, etc.)
- Screening to identify issues early in project planning that may affect scheduling and budgeting



NCDOT Project ATLAS



Advancing Transportation through Linkages, Automation, and Screening



NEEDS

- Identification of unmapped stream locations,
- Improved accuracy of existing stream locations,
- Identification of stream attributes

Headwater Streams Spatial Dataset (HSSD) Additions to North Carolina Hydrography Options

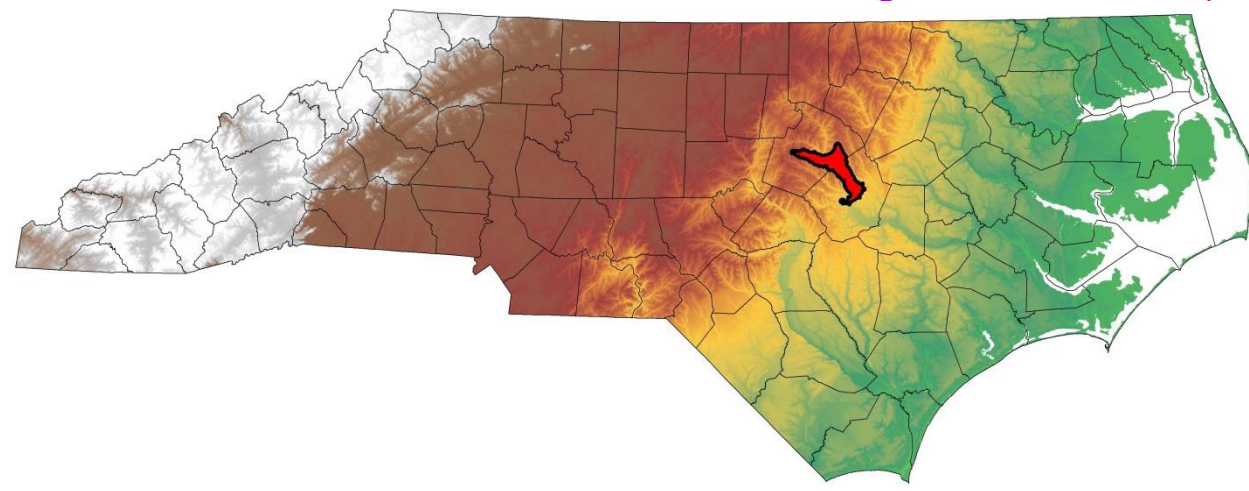
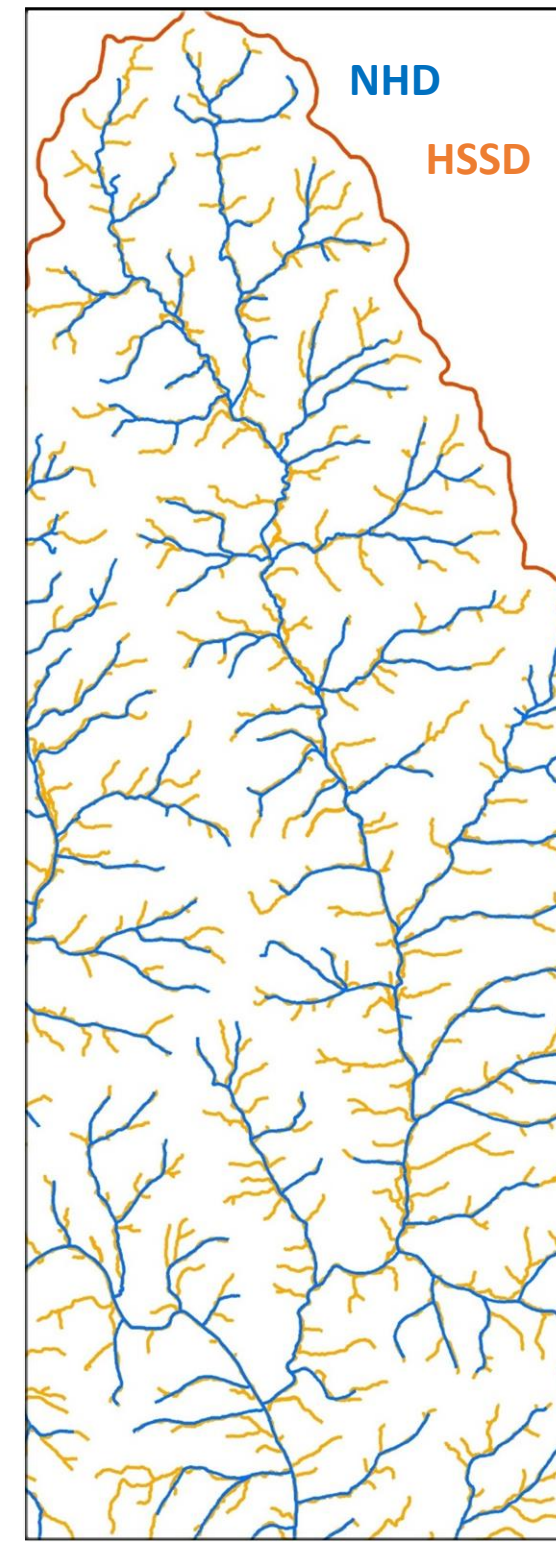
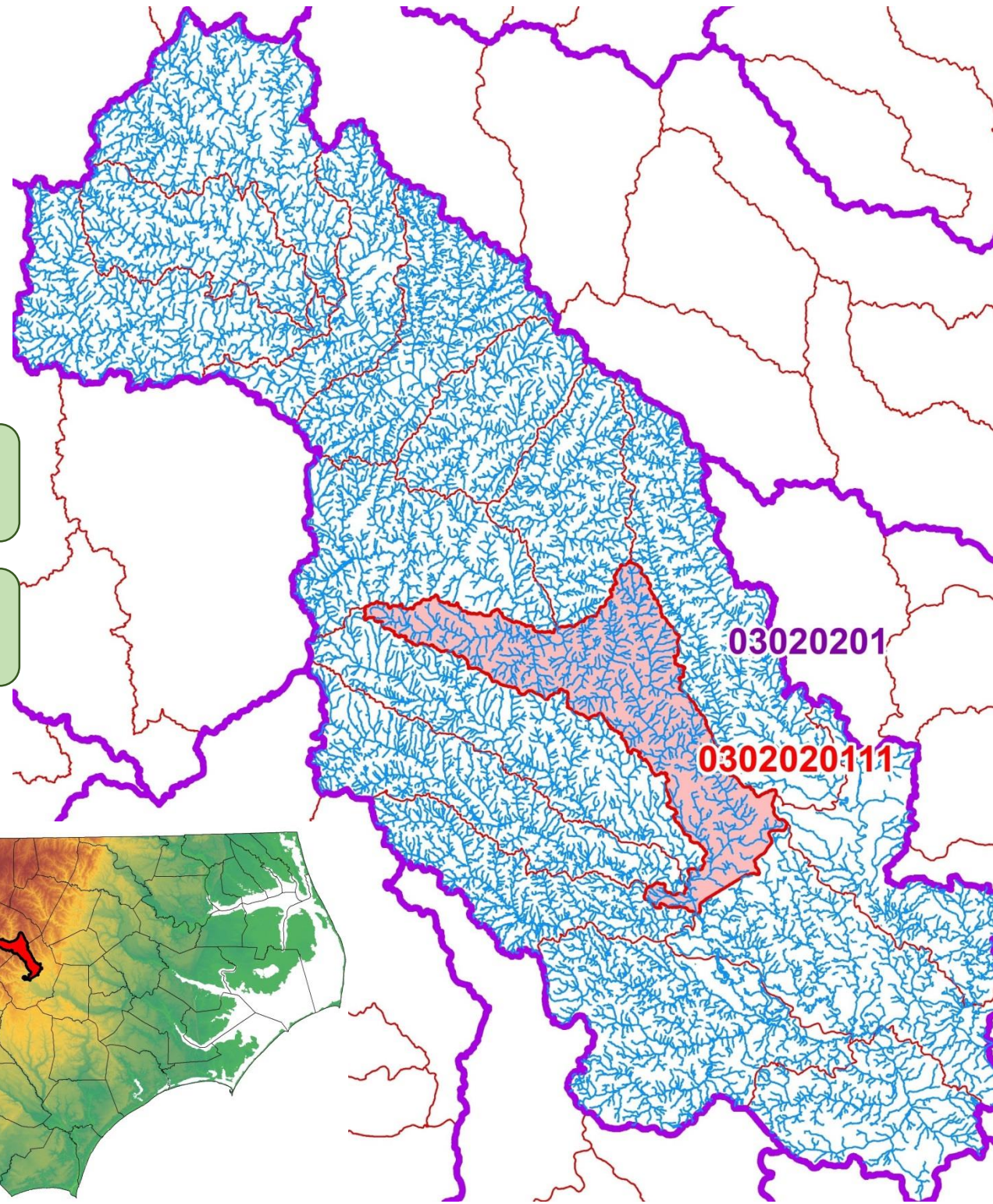
Pilot

Watershed

UPNUS11, 0302020111

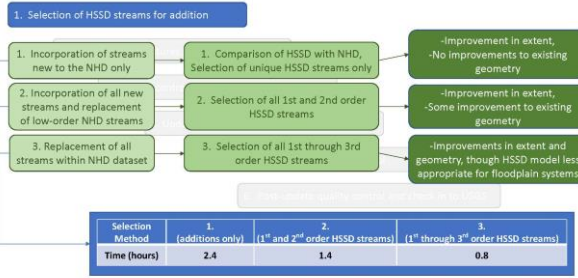
UPNUS11: 192 sq. mi.
Average of 203 ATLAS priority HUC10s: 161 sq. mi.
Average of 395 state-wide HUC10s: 177 sq. mi.

UPNUS11 = 109 percent of average HUC10 area
Average HUC10 area = 92 percent of UPNUS11

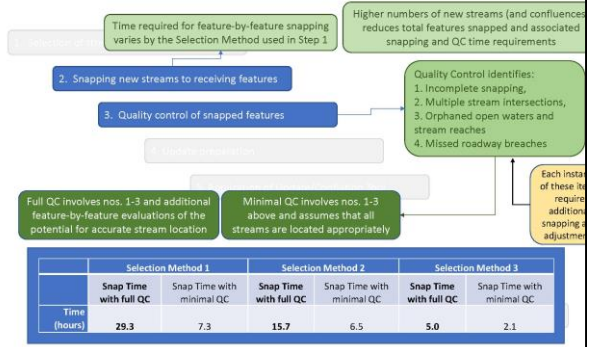


Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot

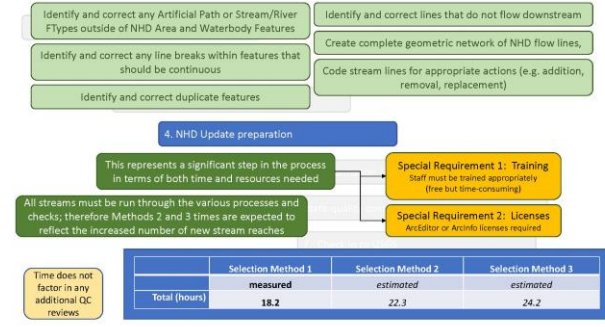
Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



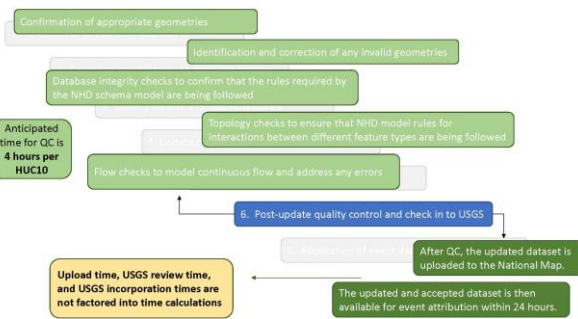
Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



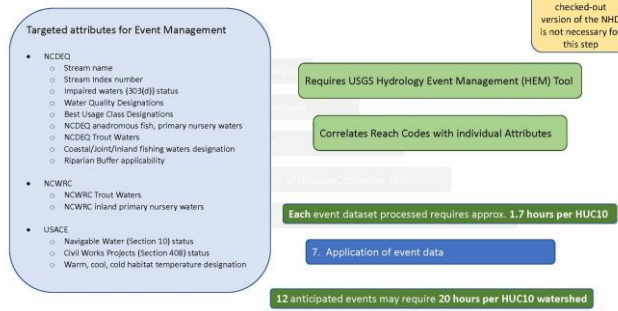
Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



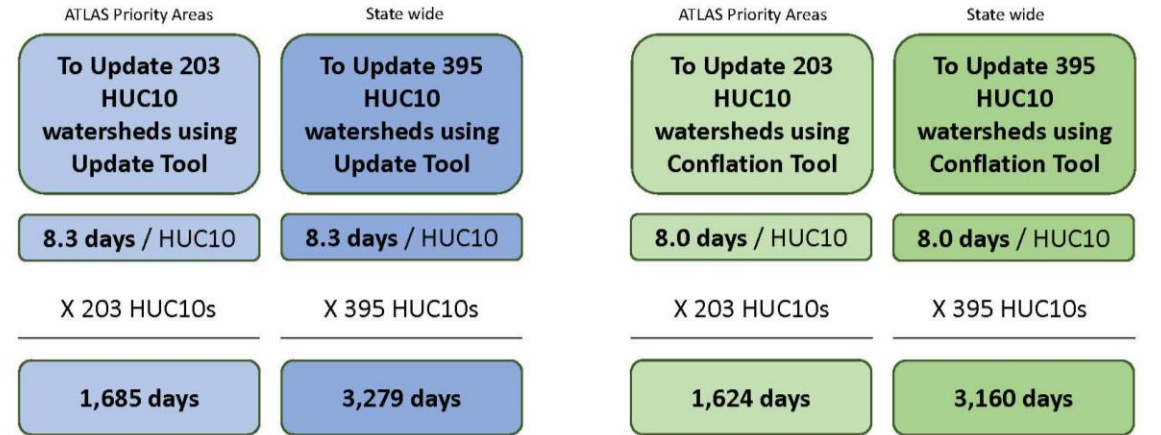
Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



Headwater Streams Spatial Dataset (HSSD) / National Hydrography Dataset (NHD) Integration Pilot



Final Results using Update Tool

	*Selection	Snapping	Snap QC	*Update Prep	Update tool	Post-Update QC	HEM tool	Total Time (avg)
Time (hours)	1.4 - 2.4	6.5 - 7.3	7.5	18.2 - 22.3	7.5	4.0	20.0	61.8 - 67.7 (65)
Time (days)	0.2 - 0.3	0.8 - 0.9	0.9	2.3 - 2.8	0.9	0.5	2.5	8.1 - 8.5 (8.3)

*Selection Methods 1 and 2 were used for time calculations, as streams incorporated by these methods generally represent a minimum set of additions to the NHD.

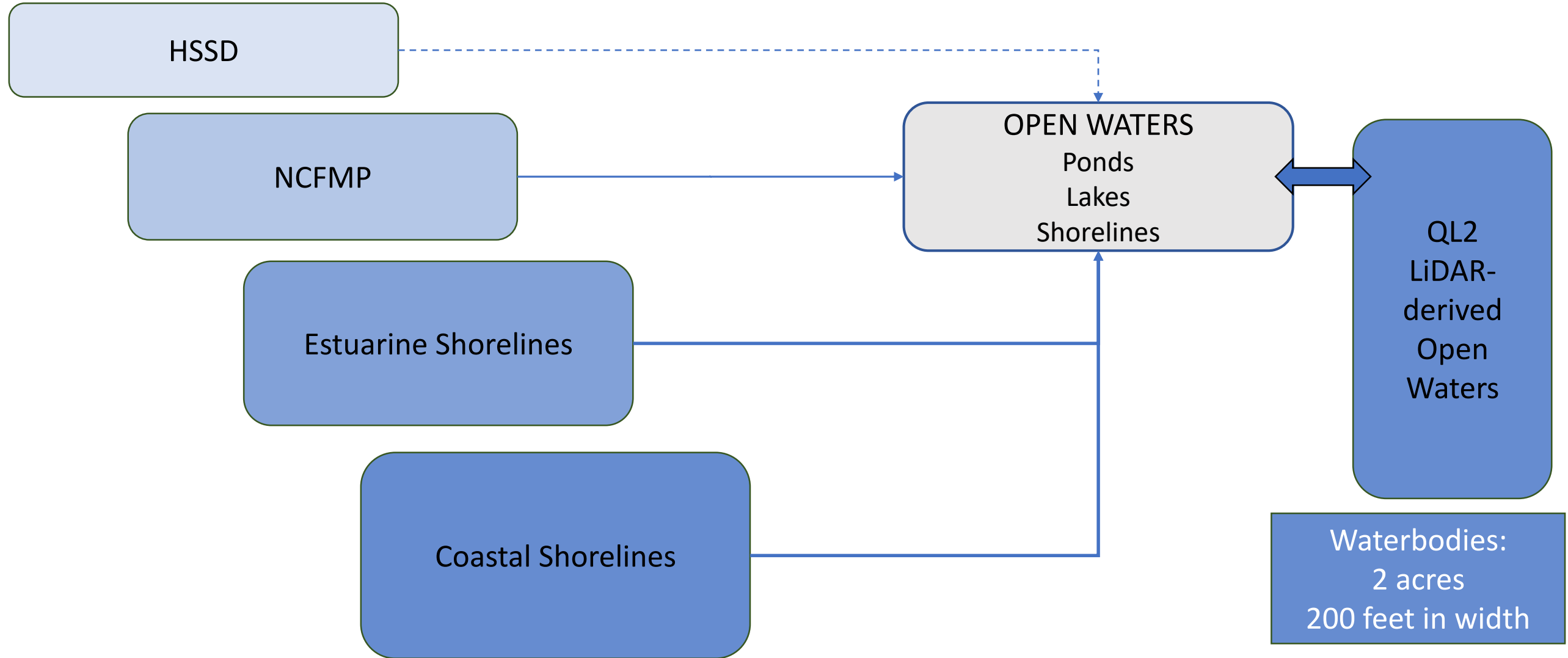
Final Results using Conflation Tool

	*Selection	Snapping	Snap QC	*Conflation Prep	Update tool	Post-Conflation QC	HEM tool	Total Time
Time (hours)	0.8	2.1	4.0	24.2	8.5	4.0	20.0	63.6
Time (days)	0.1	0.3	0.5	3.0	1.1	0.5	2.5	8.0

*Selection: Selection Method 3 was used for time calculations, as streams incorporated by these this method generally represent a potentially significant set of additions to the NHD.

ATLAS HYDROGRAPHY GENERATION

DATA NEEDS, SOURCES, AVAILABILITY, ACCURACY,
FORMATS, JOINING METHODS, ...

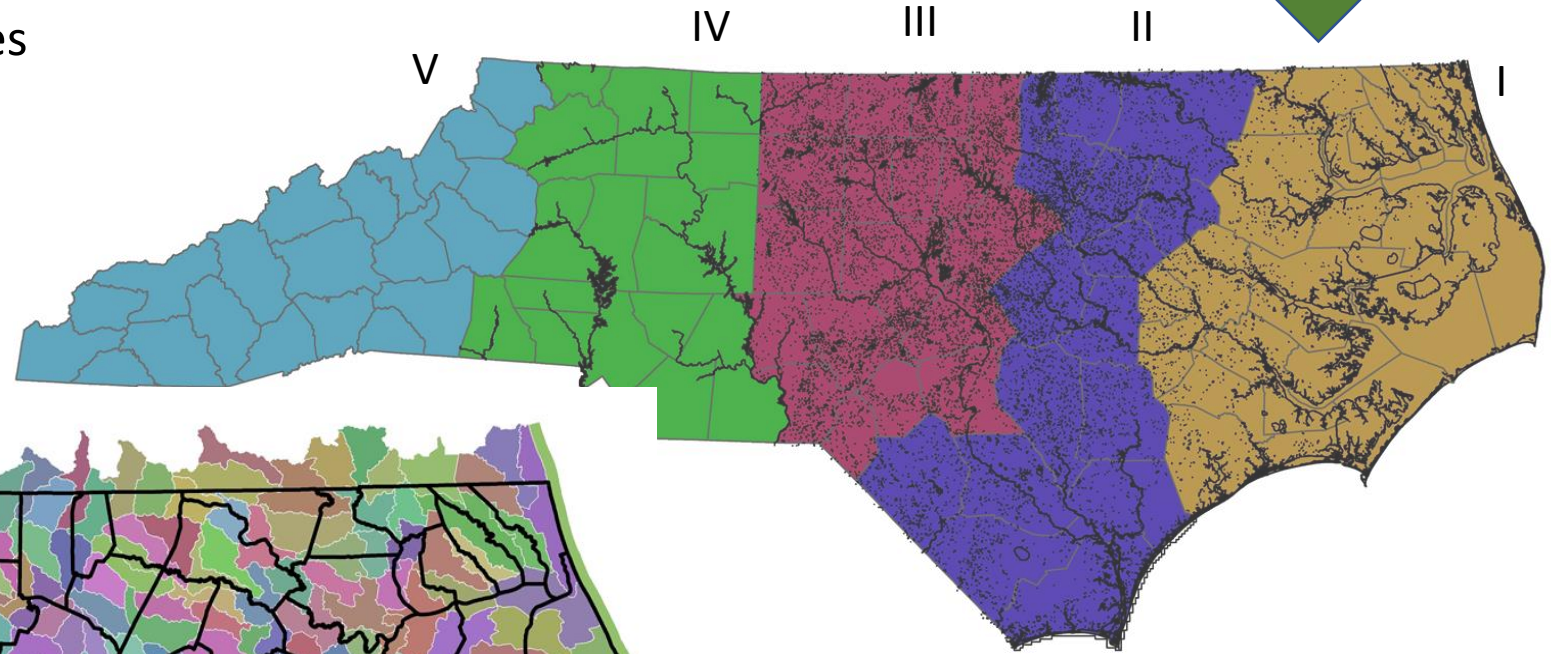


ATLAS HYDROGRAPHY GENERATION

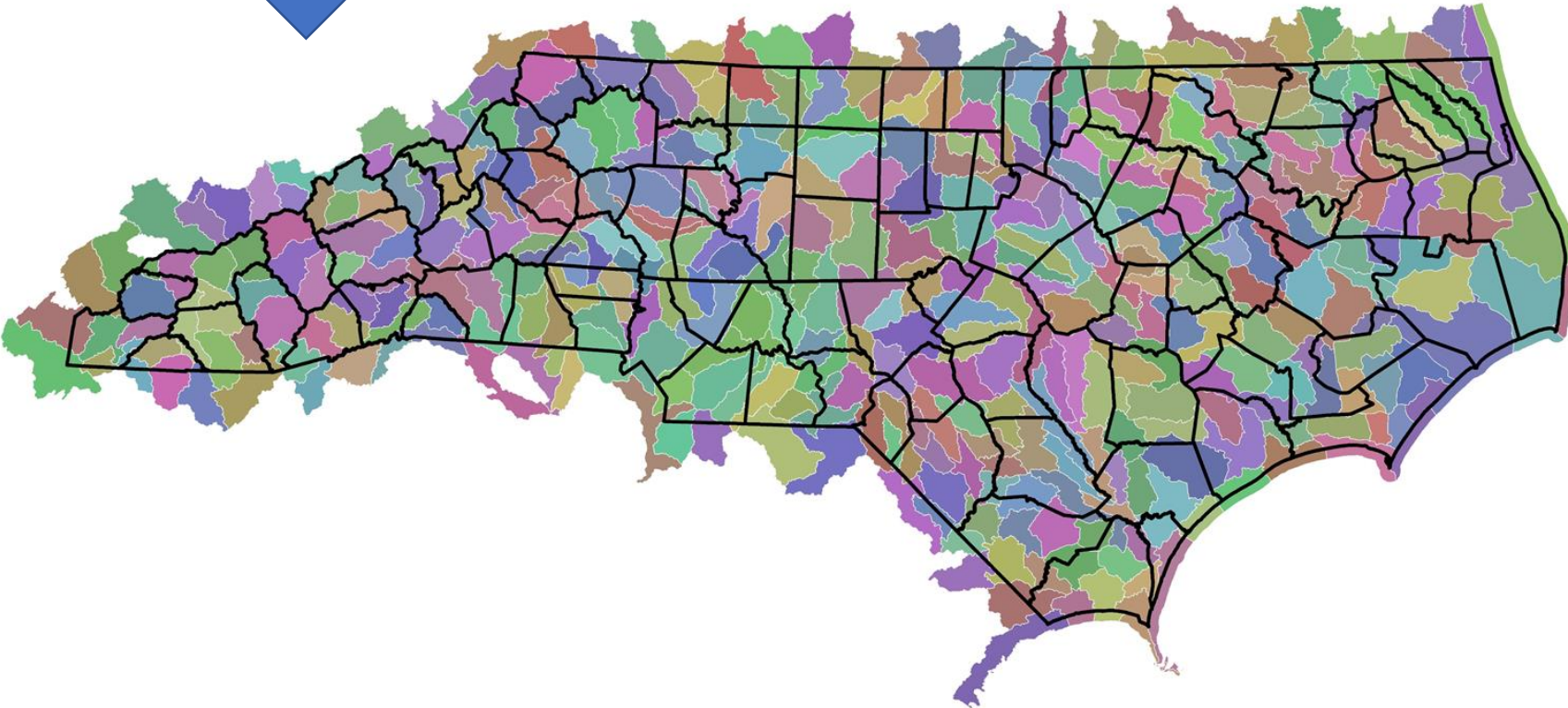
From ATLAS-HSSD Program staff:
HSSD/approximate NCFMP stream lines

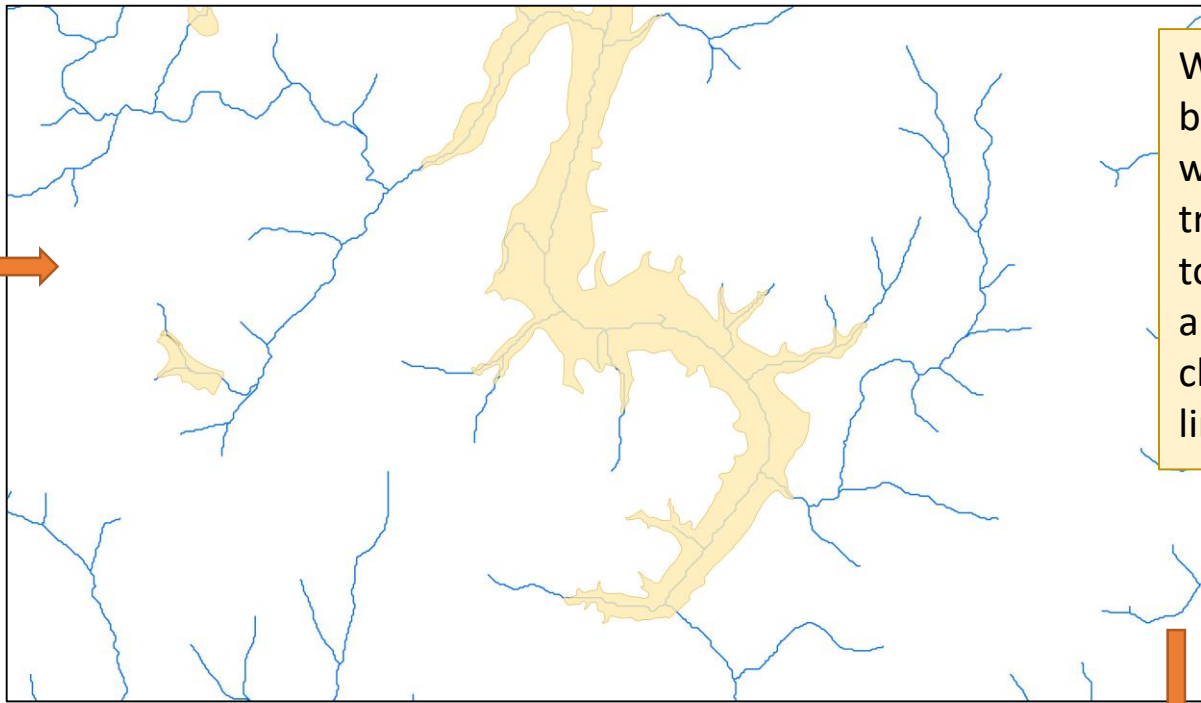
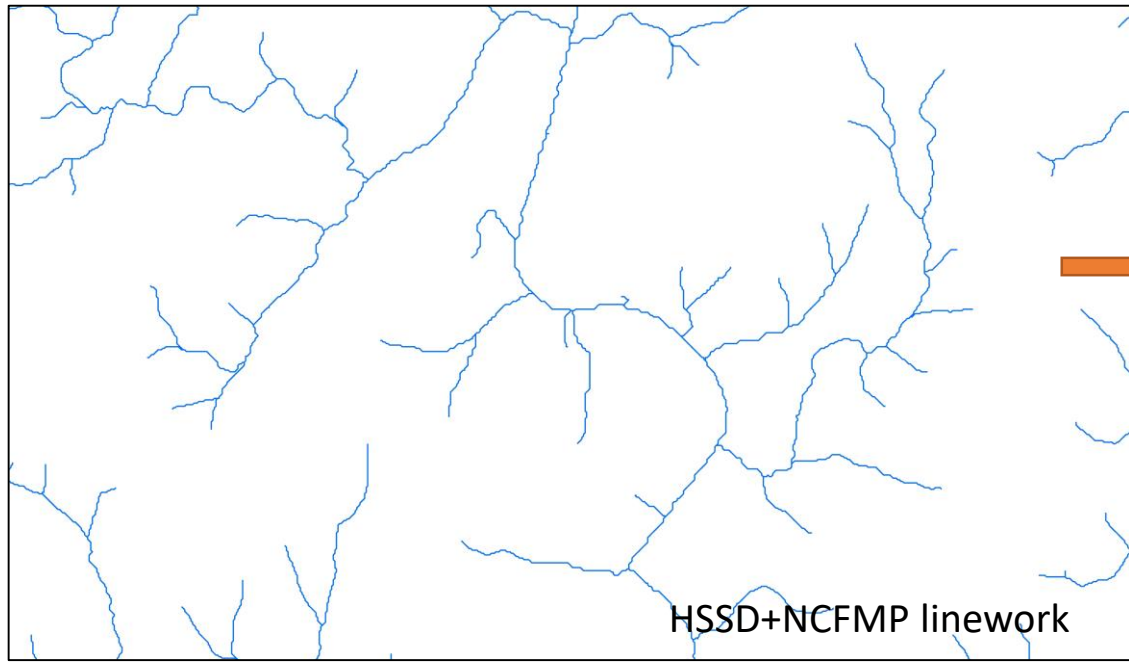


From NC Division of Emergency Management:
Hydro breaklines for LiDAR-derived waters

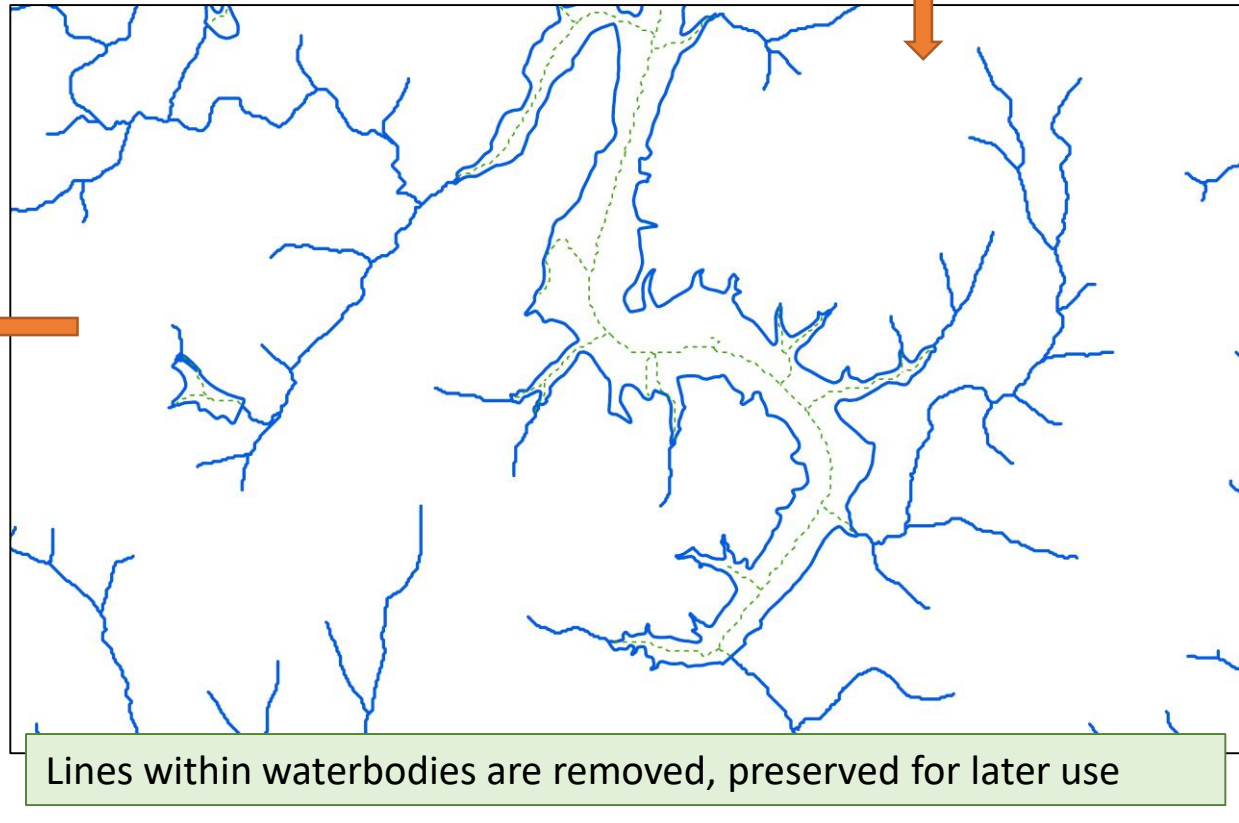
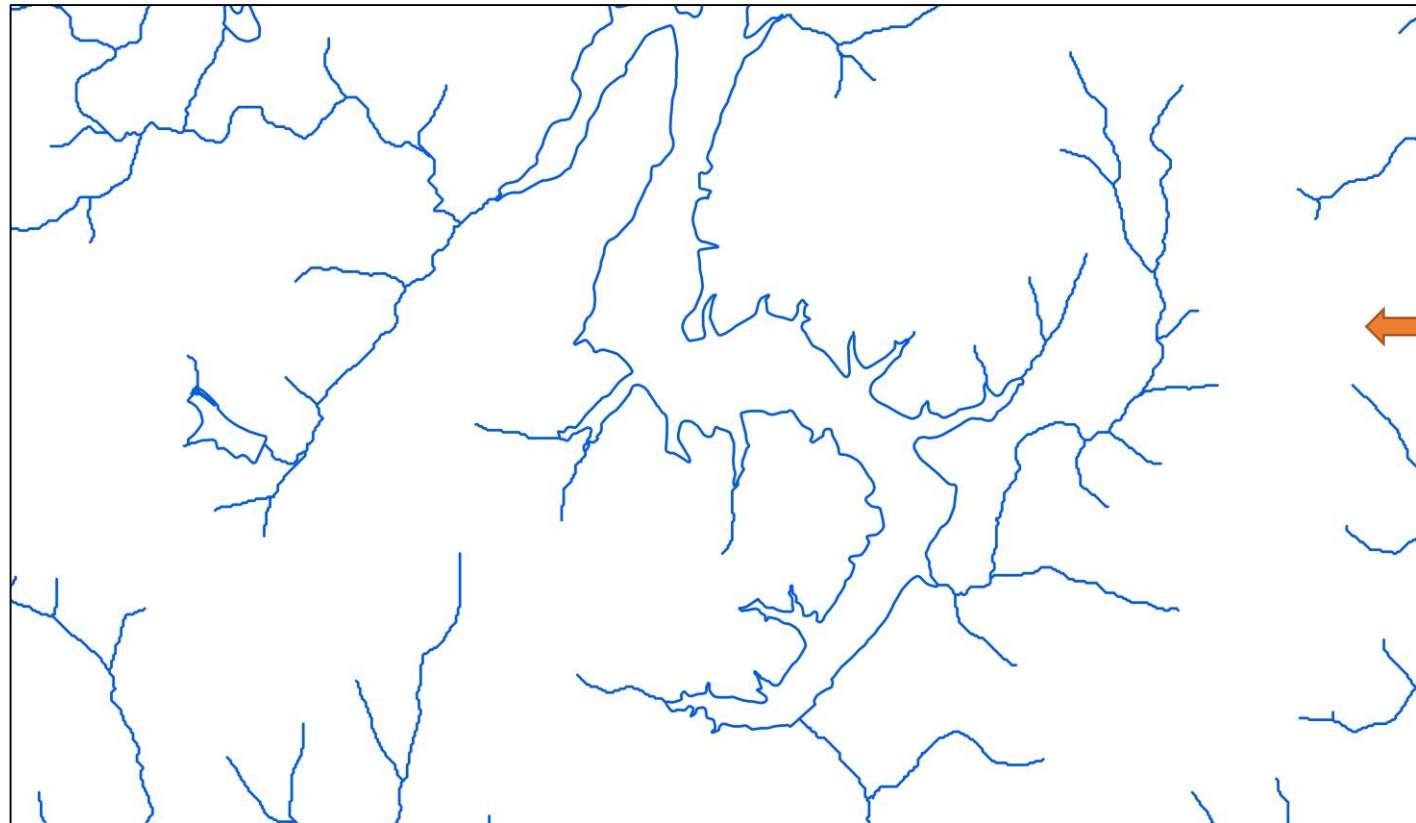


Phases I-IV – QL2 LiDAR-derived waters
Phase V area – Waters from Legacy LiDAR



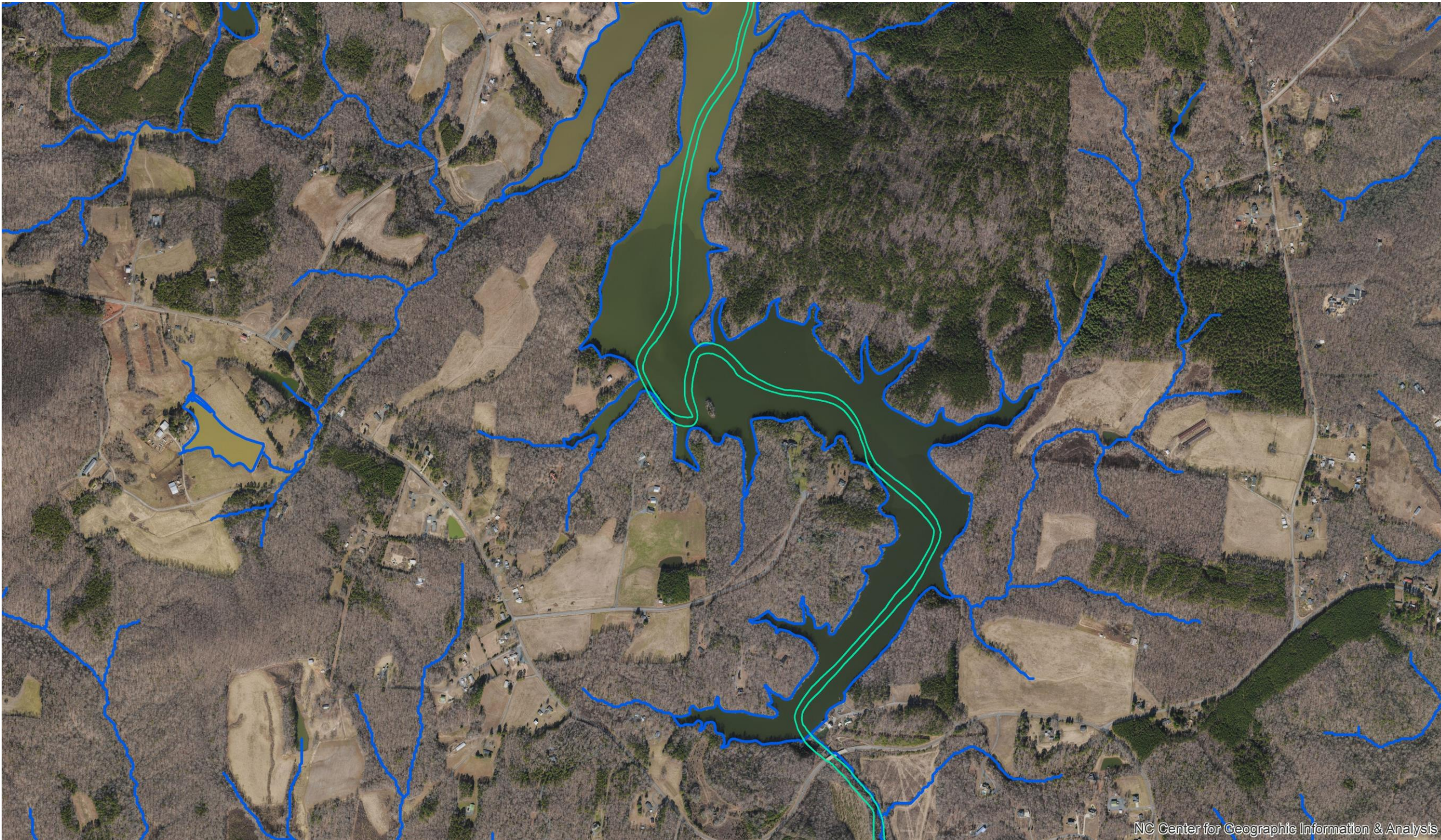


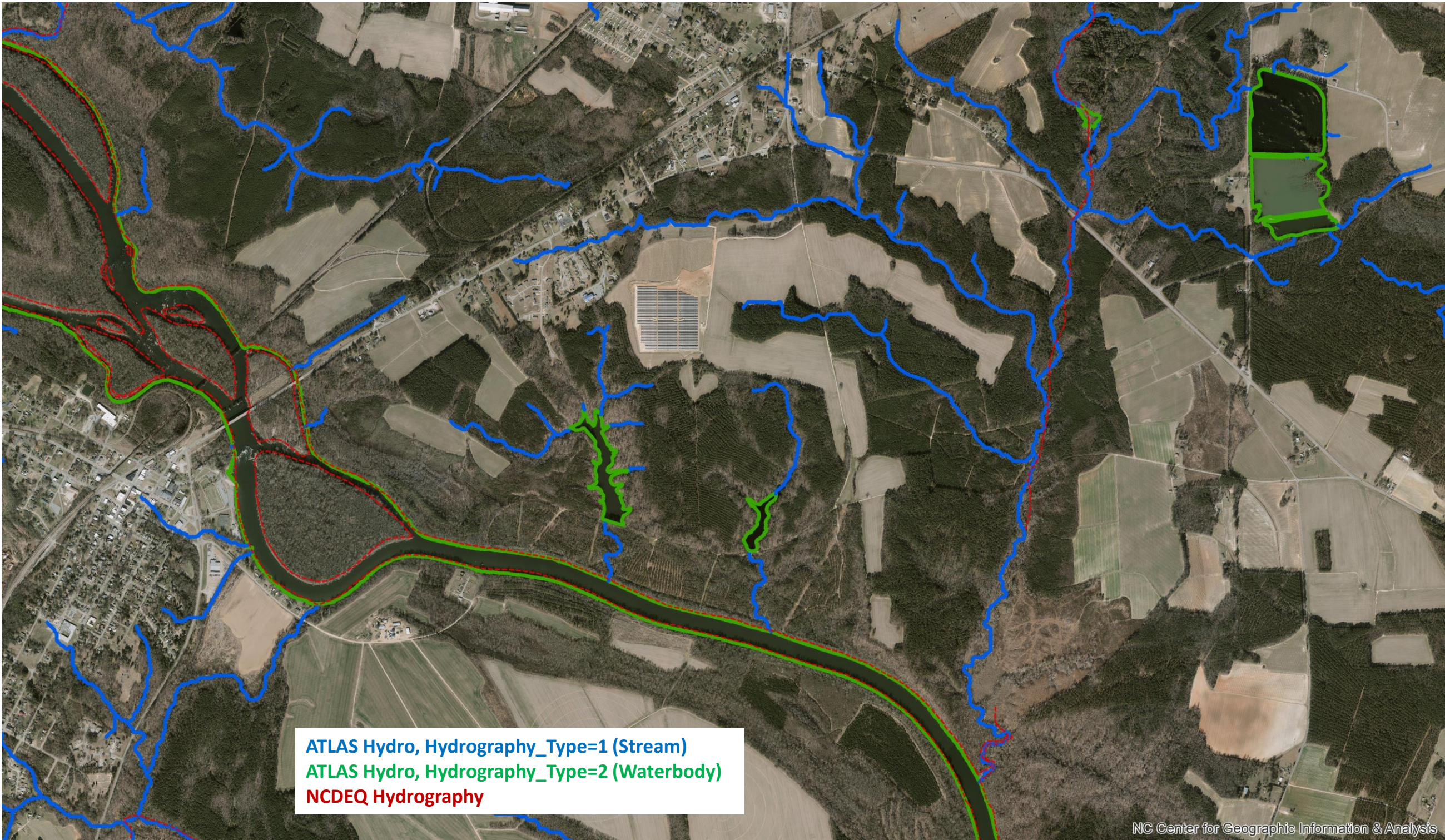
Waterbody breaklines were transformed to polygons and used to clip stream lines.



Lines within waterbodies are removed, preserved for later use

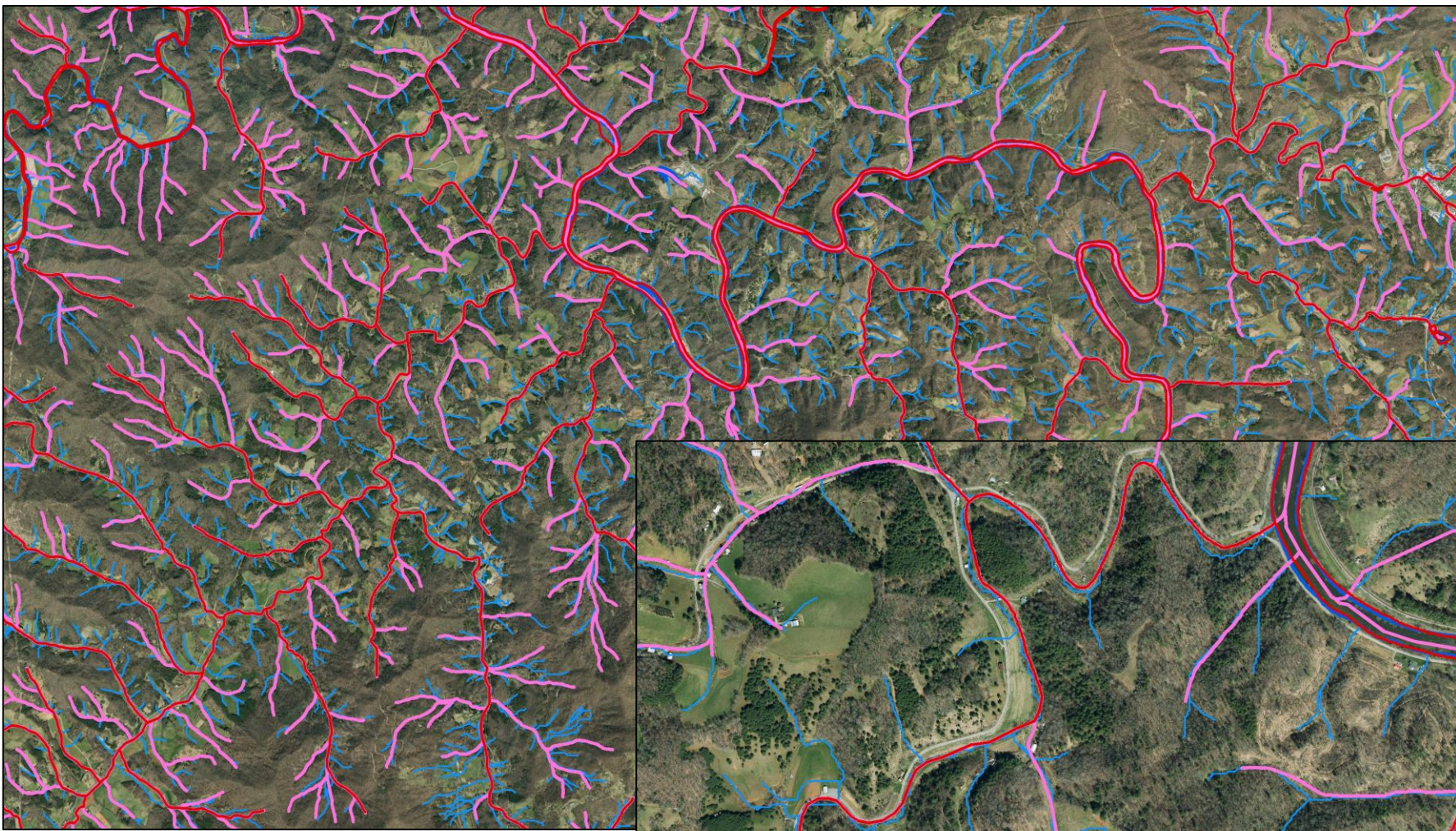




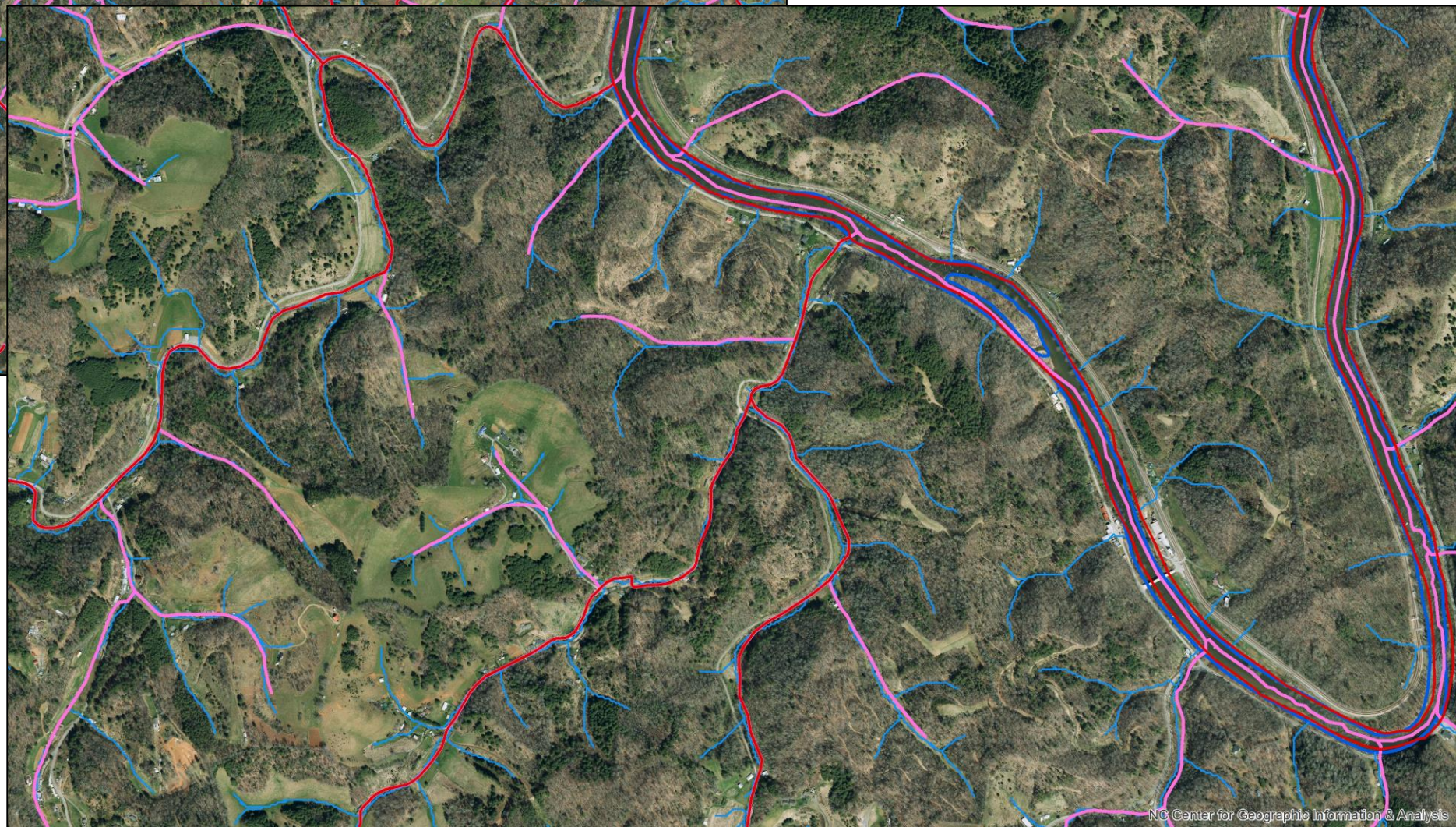


ATLAS Hydro, Hydrography_Type=1 (Stream)
ATLAS Hydro, Hydrography_Type=2 (Waterbody)
NCDEQ Hydrography





ATLAS Hydro, Hydrography_Type=1 (Stream)
ATLAS Hydro, Hydrography_Type=2 (Waterbody)
NCDEQ Hydrography
NHD Hydrography

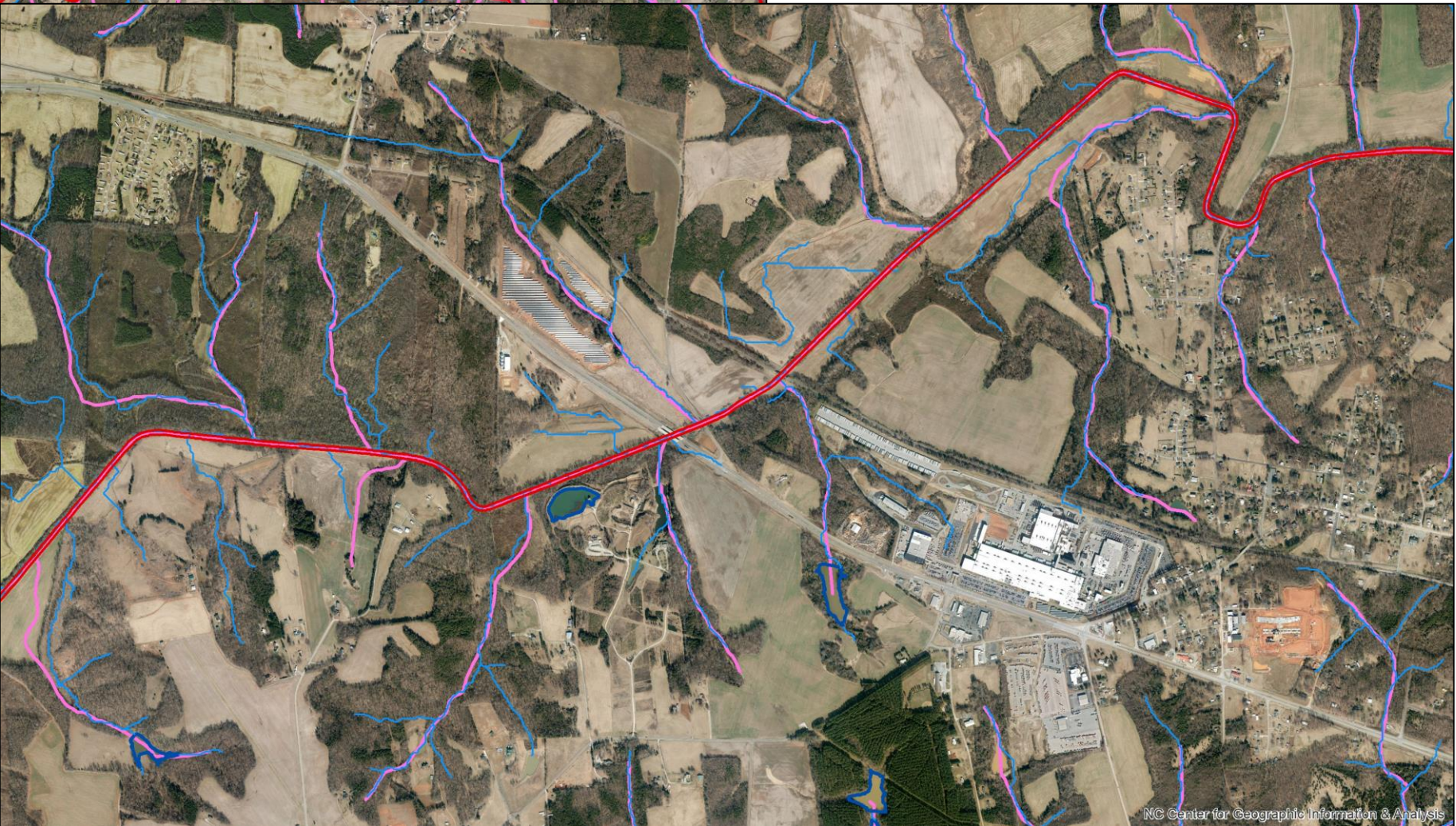
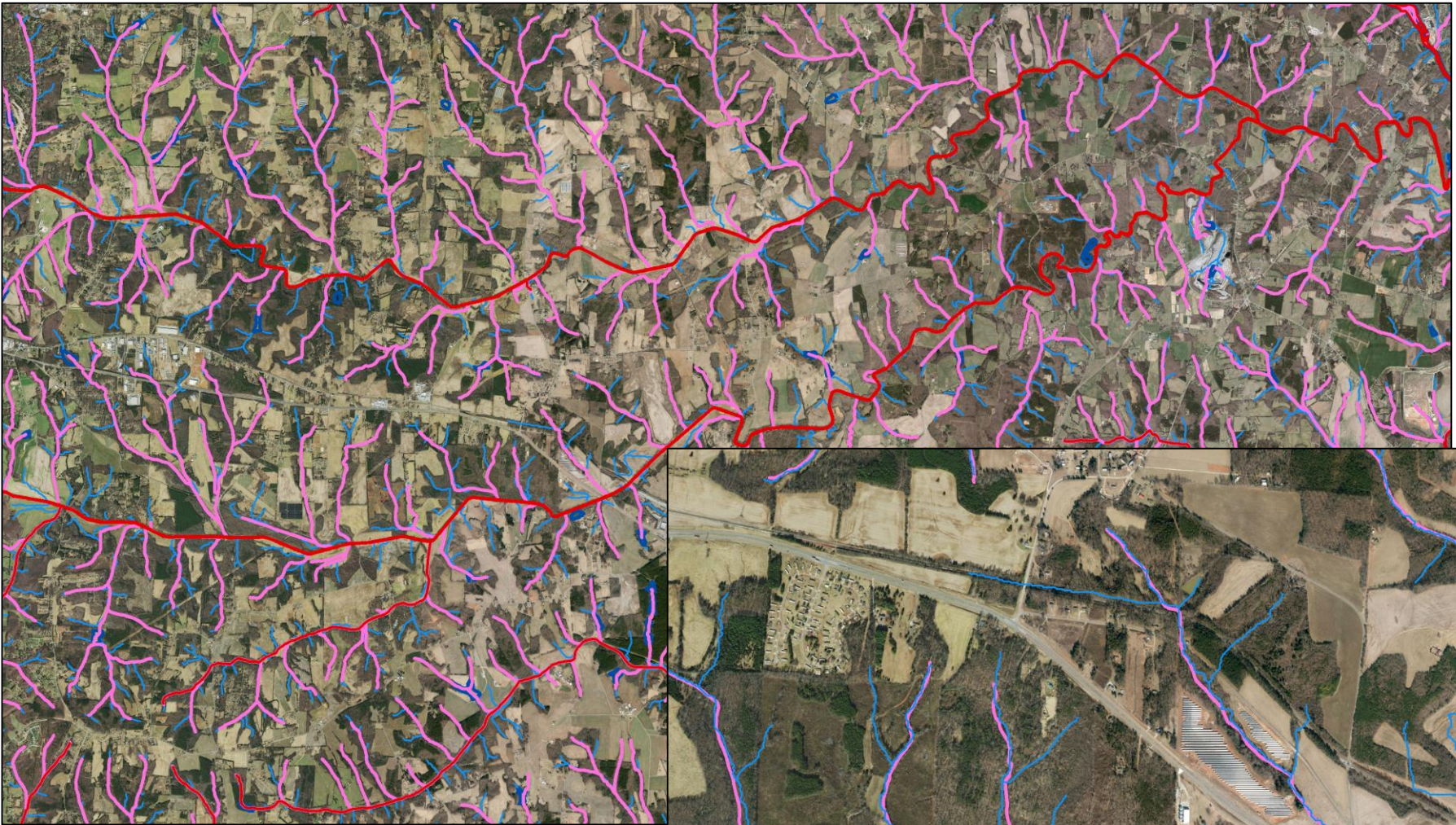


Yancey County

ATLAS Hydro, Hydrography_Type=1 (Stream)
ATLAS Hydro, Hydrography_Type=2 (Waterbody)
NCDEQ Hydrography

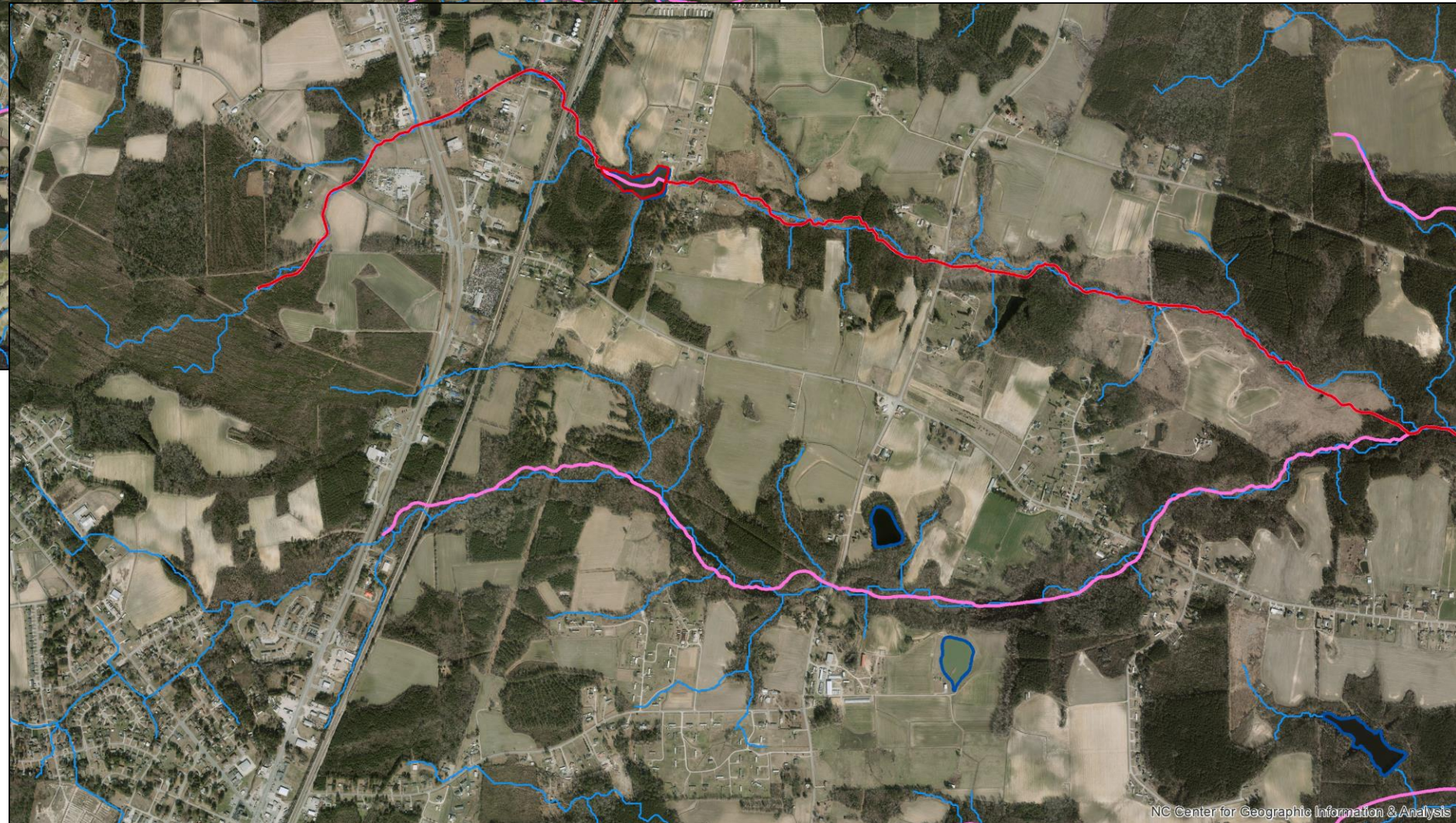
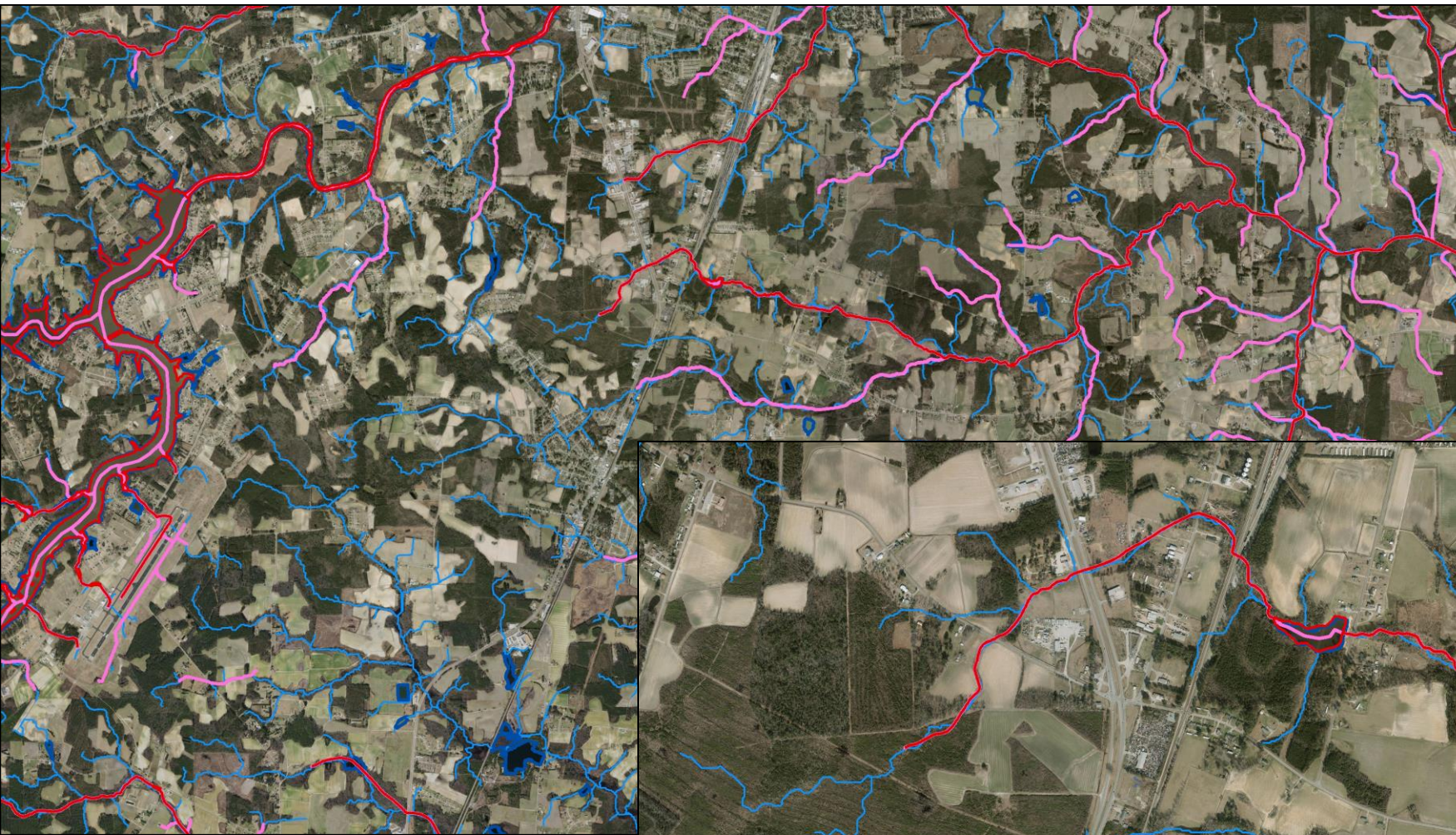
Caldwell County

ATLAS Hydro, Hydrography_Type=1 (Stream)
ATLAS Hydro, Hydrography_Type=2 (Waterbody)
NCDEQ Hydrography
NHD Hydrography

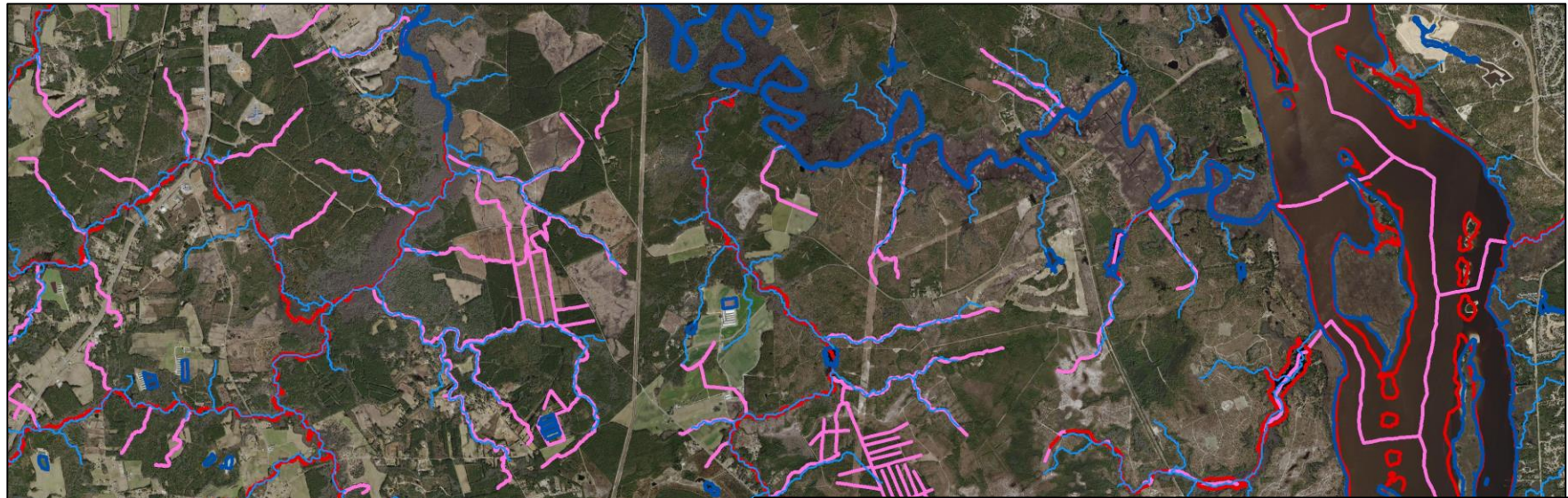


Rowan County

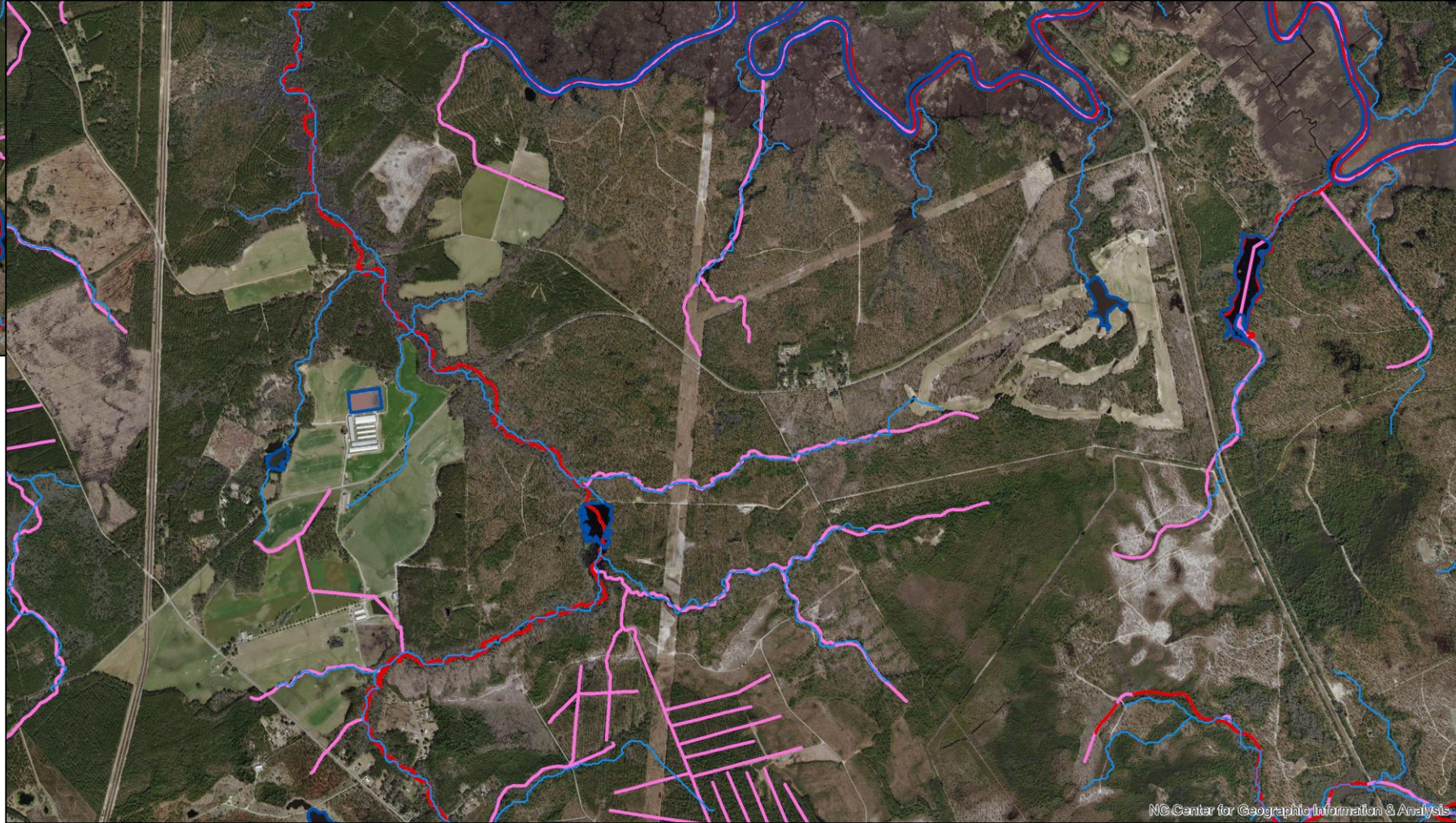
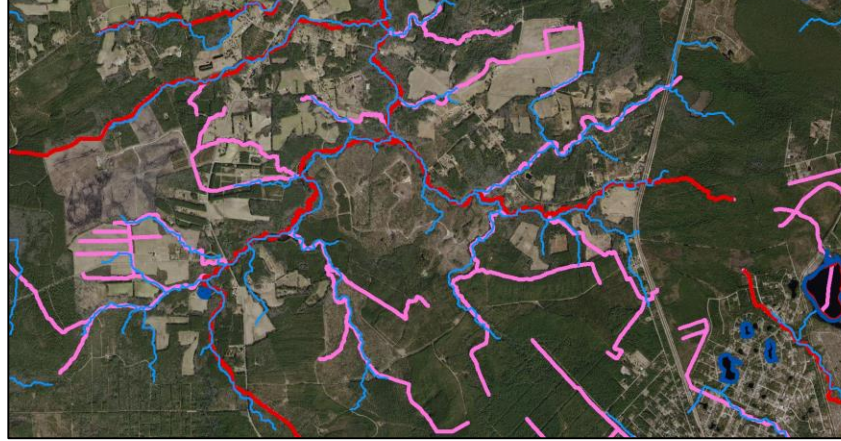
ATLAS Hydro, Hydrography_Type=1 (Stream)
ATLAS Hydro, Hydrography_Type=2 (Waterbody)
NCDEQ Hydrography
NHD Hydrography



Nash County



ATLAS Hydro, Hydrography_Type=1 (Stream)
ATLAS Hydro, Hydrography_Type=2 (Waterbody)
NCDEQ Hydrography
NHD Hydrography



Brunswick County

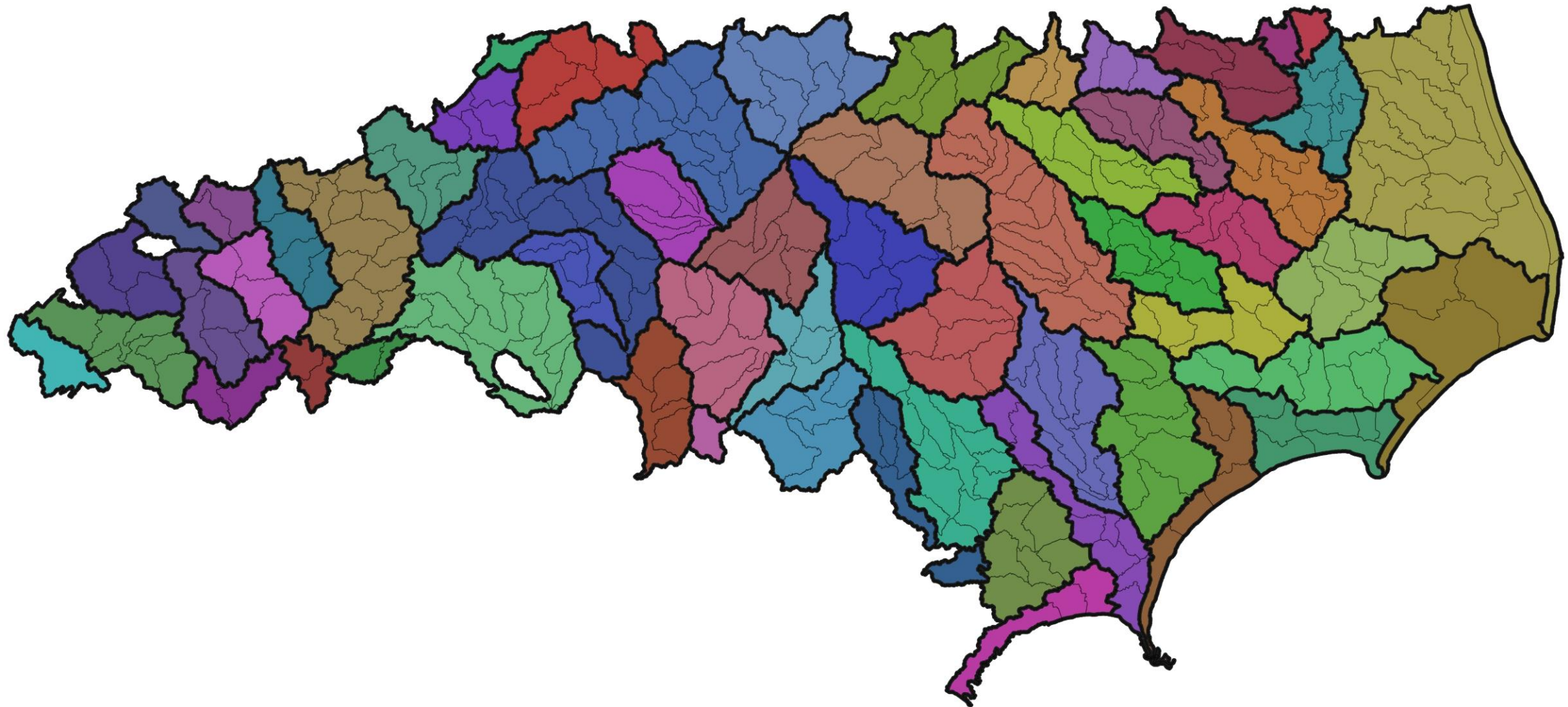
Legacy LiDAR-derived linework was integrated where necessary

Ecoregions without an HSSD model

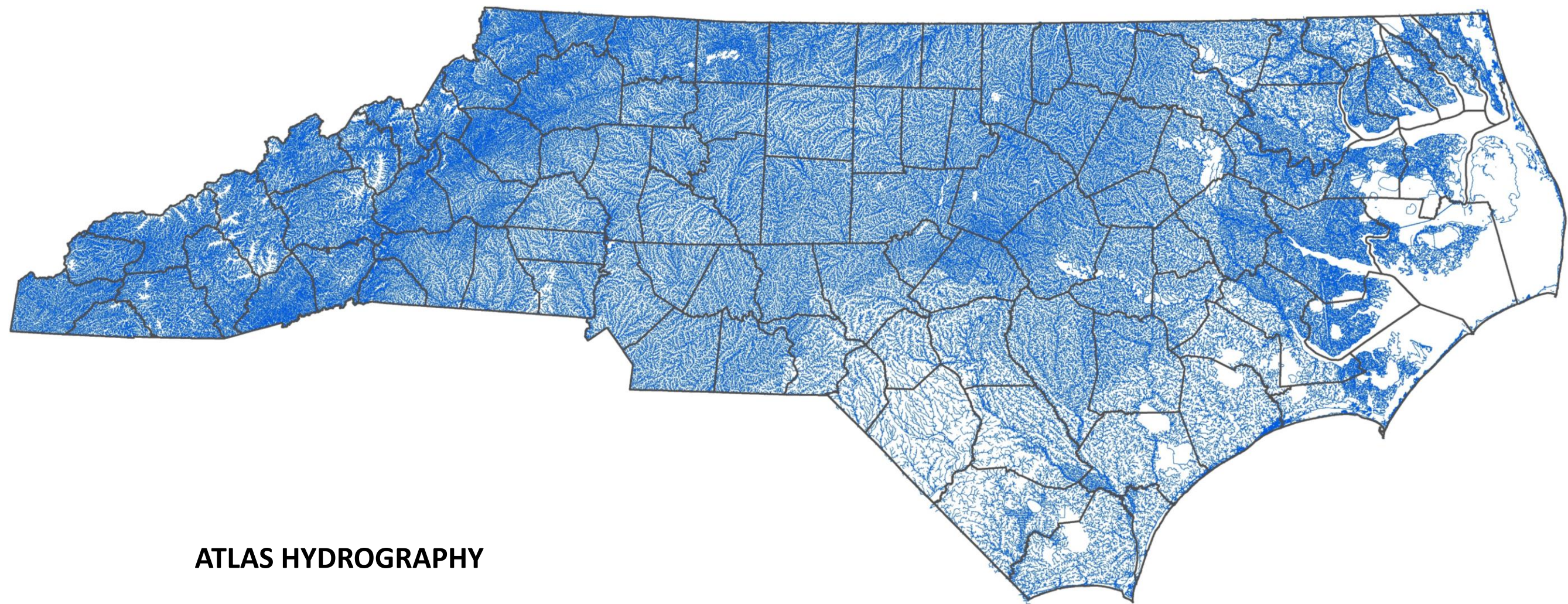
Waterbodies within the Phase V LiDAR collection area

345 HUC10 watersheds

54 HUC8 watersheds



Stream lines were snapped to match at HUC10 and HUC8 boundaries where appropriate
Topology checks were run to insure complete connectivity of the stream network



ATLAS HYDROGRAPHY

1.6 million records

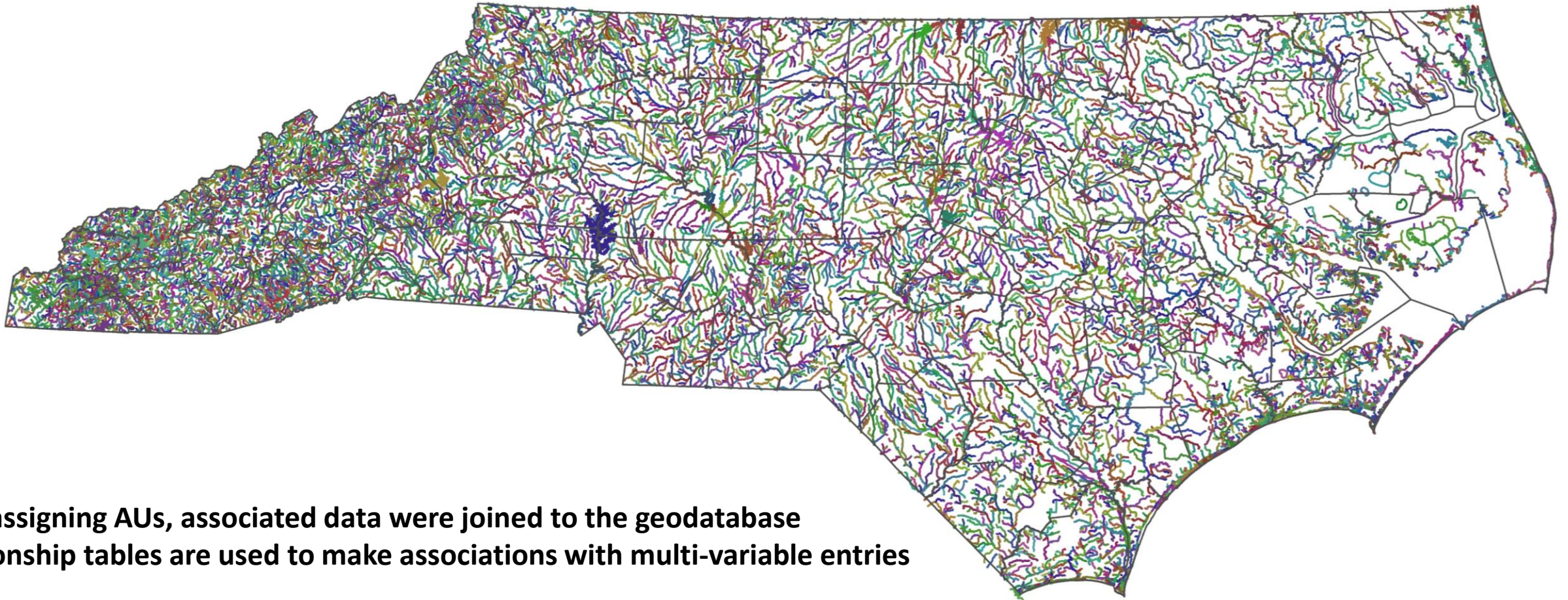
**336k records for streams with
designated Assessment Units**

ATTRIBUTION

Approximately 13k streams have NCDEQ-assigned Assessment Units (AUs) and associated water quality data

Developed a model to assign NCDEQ AUs to ATLAS Hydro geometry from existing NCDEQ-maintained data

Errors were identified with automated and manual methods and repaired



**After assigning AUs, associated data were joined to the geodatabase
Relationship tables are used to make associations with multi-variable entries**

**ATLAS HYDROGRAPHY v1.0
and v1.1**

**ATTRIBUTE
FIELDS**

	Attribute Field	Source
1	AU_Number	NCDEQ Integrated Report 2018
2	AU_Name	
3	AU_ID	
4	cycle_yr	
5	IRC*	
6	ACS*	
7	RFR*	
8	POI*	
9	Collection	
10	asmnt_stat	
11	F_303dyr	
12	INTEGRATED_REPORT_2018_ONE_MAT CH	
13	INTEGRATED_REPORT_2018_COMME NTS	
14	AU_Descrip	NCDEQ WRAPS_AU_ Classifications
15	Subbasin	
16	HUC8	
17	AU_LengthA_1	
18	AU_Units	
19	hydroorder	
20	created_cy	
21	previous_AU	
22	Status	
23	GIS_Featur	
24	AU_Type	
25	markupands	
26	markupan_1	
27	CLASSIFICATIONS_ONE_MATCH	
28	CLASSIFICATIONS_COMMENTS	
29	BIMS_INDEX*	NCDEQ Water Quality Classifications
30	BIMS_Name	
31	BIMS_Descr	
32	BIMS_Class*	
33	BIMS_Date	
34	Shape_STLe	
35	O_IR_CAT	NCDEQ Water Quality Ratings
36	O_USR	
37	F2018	NCDEQ WRAPS_AU_Ratings
38	WRAPS_RATINGS_ONE_MATCH	
39	WRAPS_RATINGS_COMMENTS	

	Attribute Field	Source
40	NC_Basin	NCDEQ Water Quality Assessments
41	AU_LengthA	
42	USR_Long	
43	USC_LongVe	
44	RFR_Long	
45	POI_long	
46	d_year	
47	Shape_len	
48	WATERQ_ASMNTS_ONE_MATCH	
49	WATERQ_ASMNTS_COMMENTS	
50	LINKNO	HSSD Data
51	DSLINKNO	
52	USLINKNO1	
53	USLINKNO2	
54	DSNODEID	
55	StrmOrder	
56	Length	
57	Magnitude	
58	DSCOntArea	
59	strmDrop	
60	Slope	
61	StraightL	
62	USContArea	
63	WSNO	
64	DOUTEND	
65	DOUTSTART	
66	DOUTMID	
67	HYDRO_TYP	Additional ATLAS/Agency Data
68	DrainTo_AU	
69	EBTJV_TR	
70	CCW_Hab	
71	DBCJIW	
72	Z_DS	
73	Z_Mid	
74	Z_US	

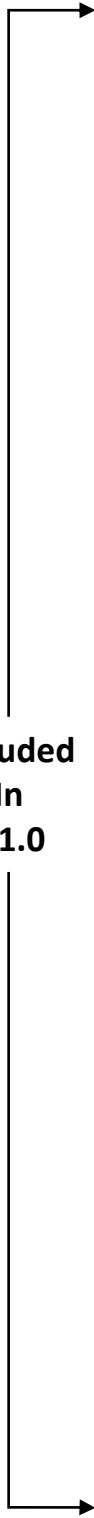
**Included
In
v 1.0**

**Coming
In
v 1.1**

**Included
In
v 1.0**

**Coming
In
v 1.1**

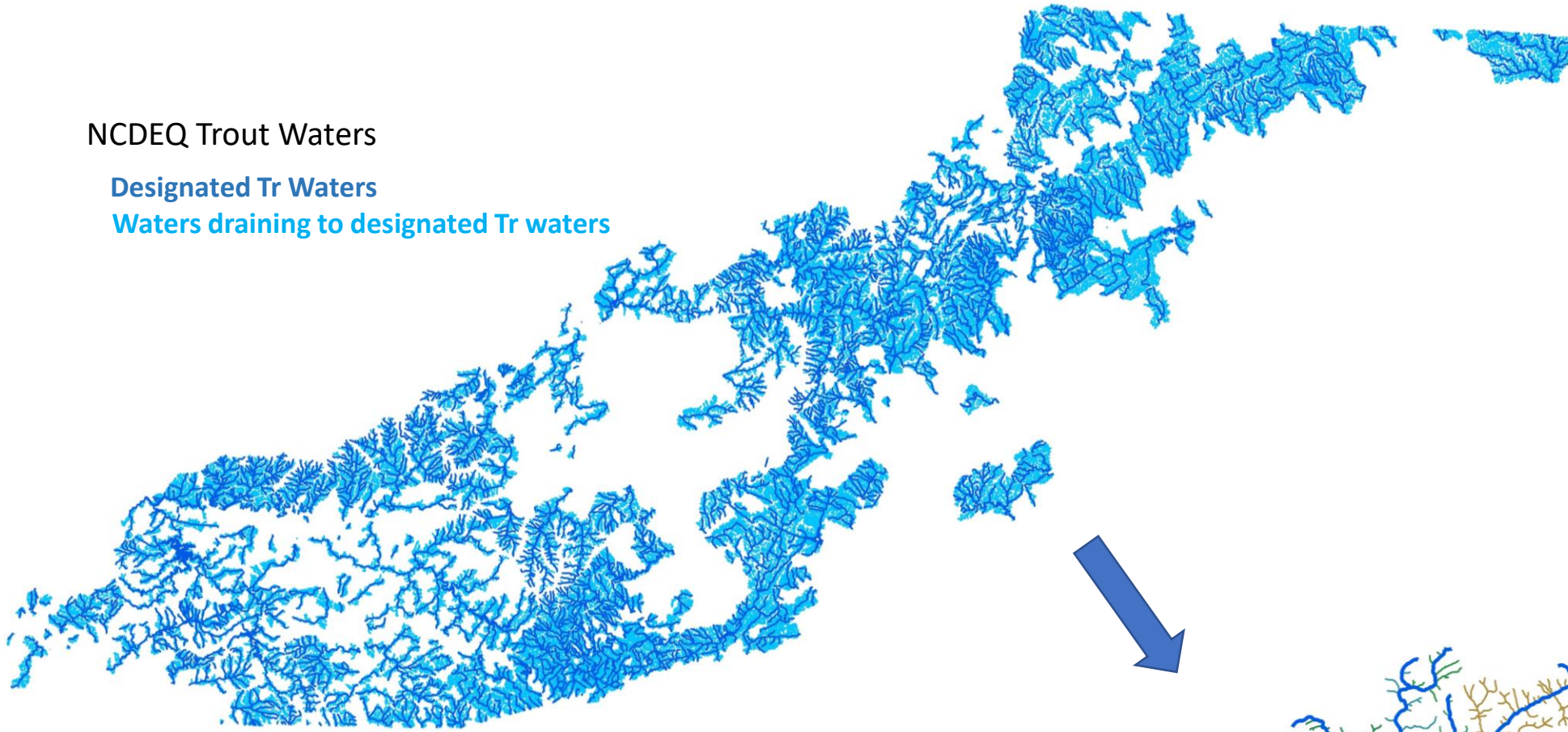
**Included
In
v 1.0**



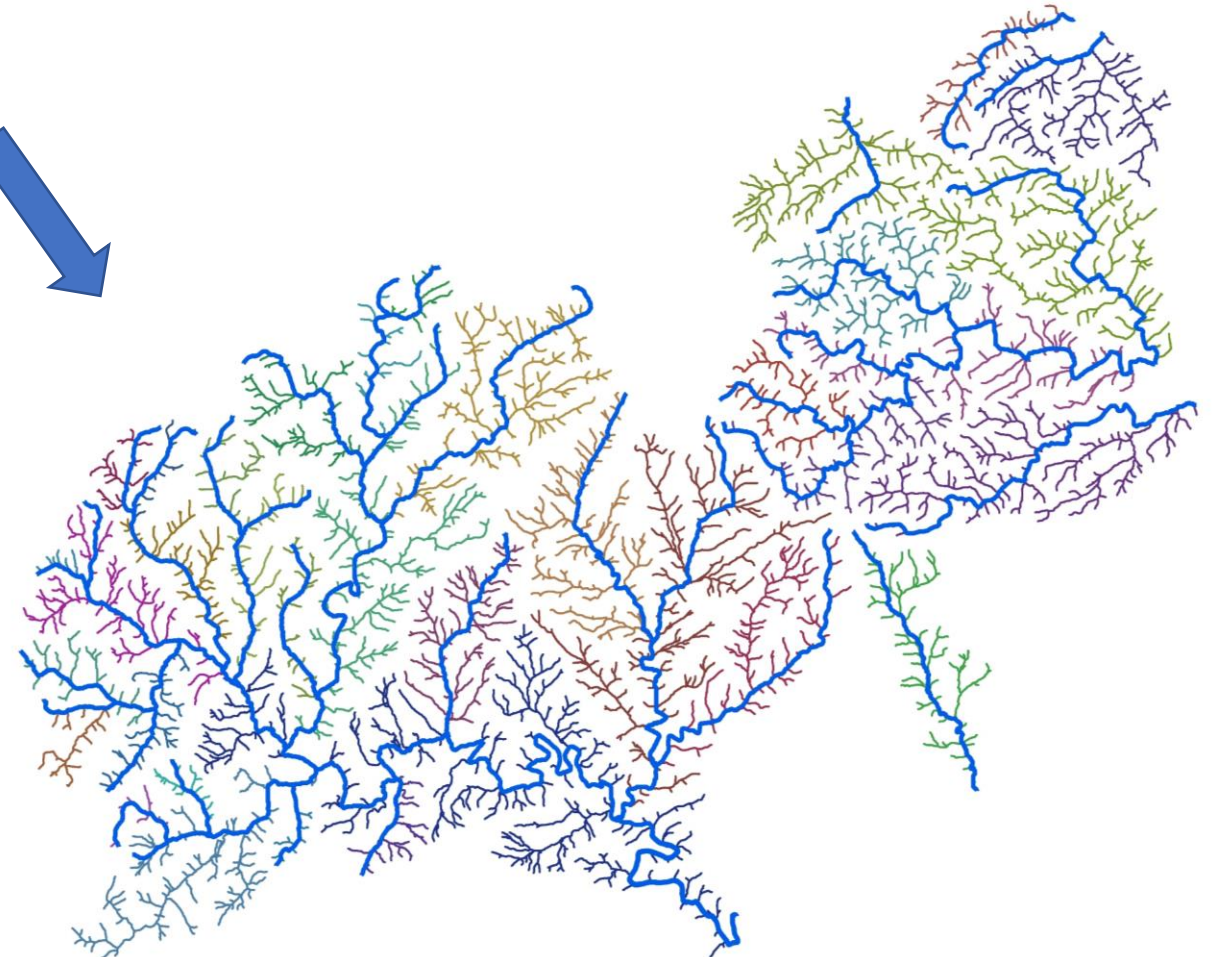
NCDEQ Trout Waters

Designated Tr Waters

Waters draining to designated Tr waters

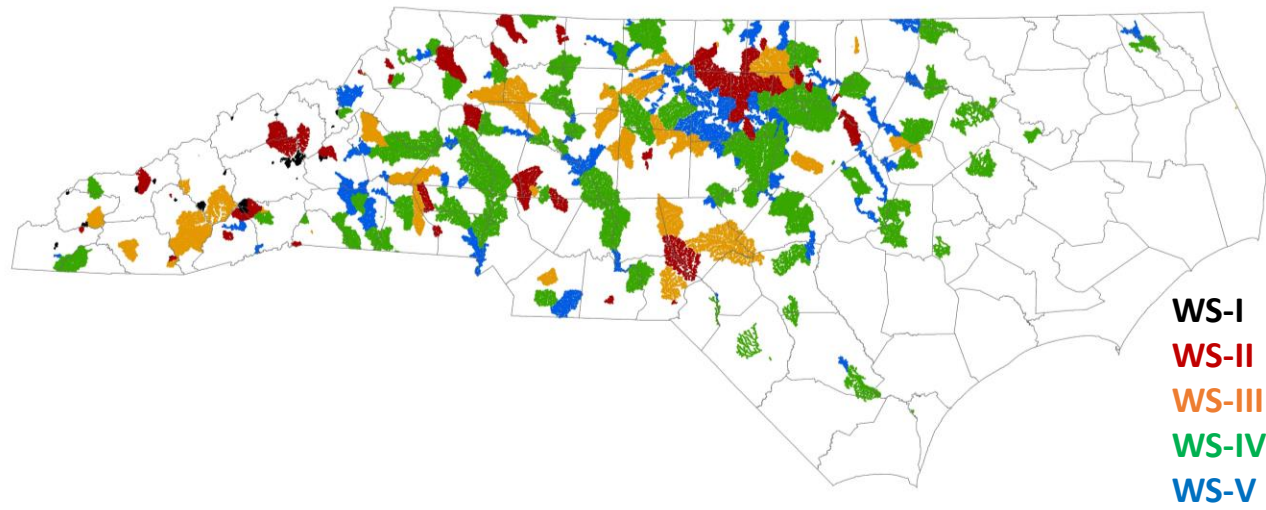
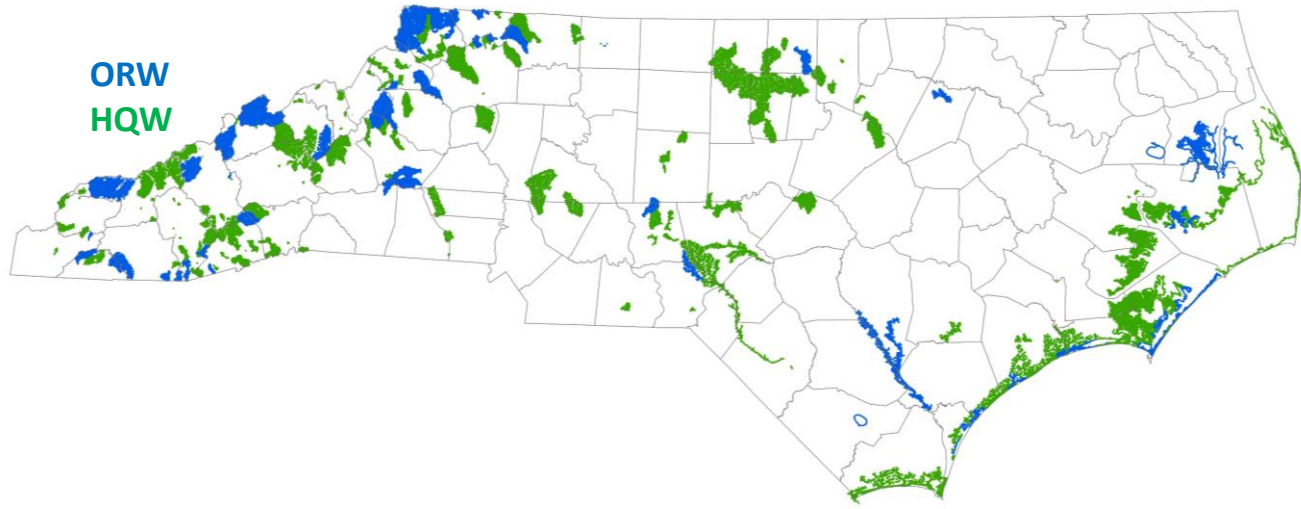


“AU_DrainTo” Field



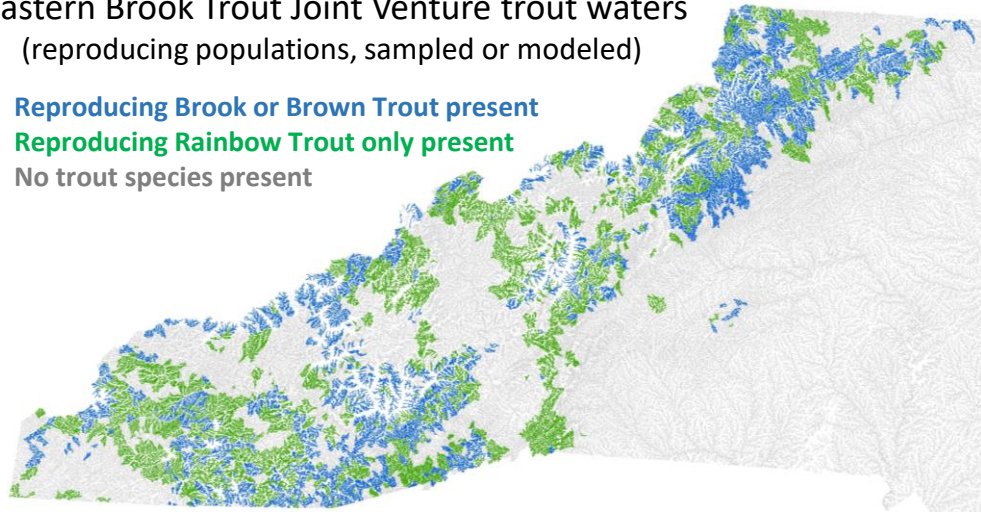
Identifies the receiving waters of undesigned streams (no designated AU)
Allows ATLAS tools to automatically identify receiving waters and appropriate classifications

Designated Trout Waters with assigned AUs
Streams without AU#s that share receiving waters

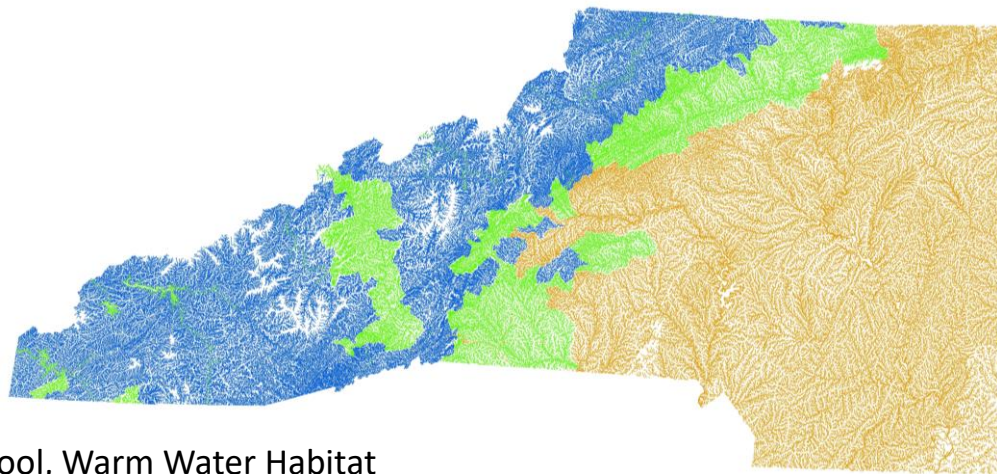


Eastern Brook Trout Joint Venture trout waters
(reproducing populations, sampled or modeled)

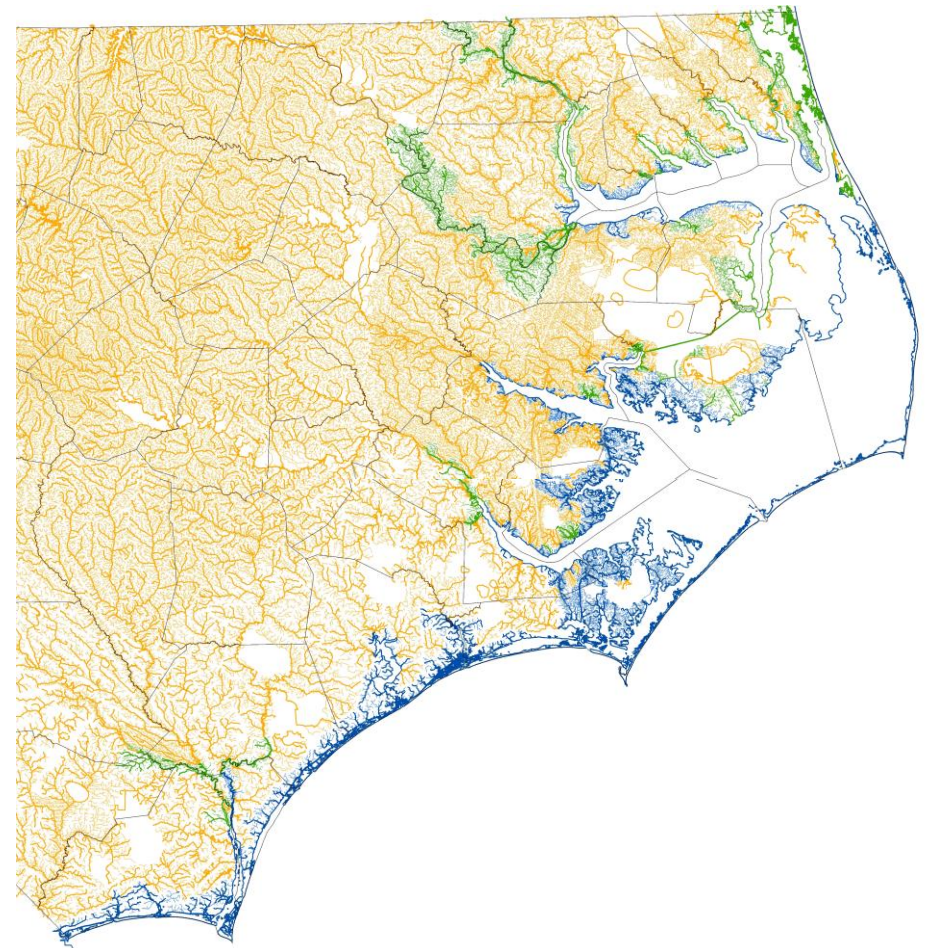
Reproducing Brook or Brown Trout present
Reproducing Rainbow Trout only present
No trout species present

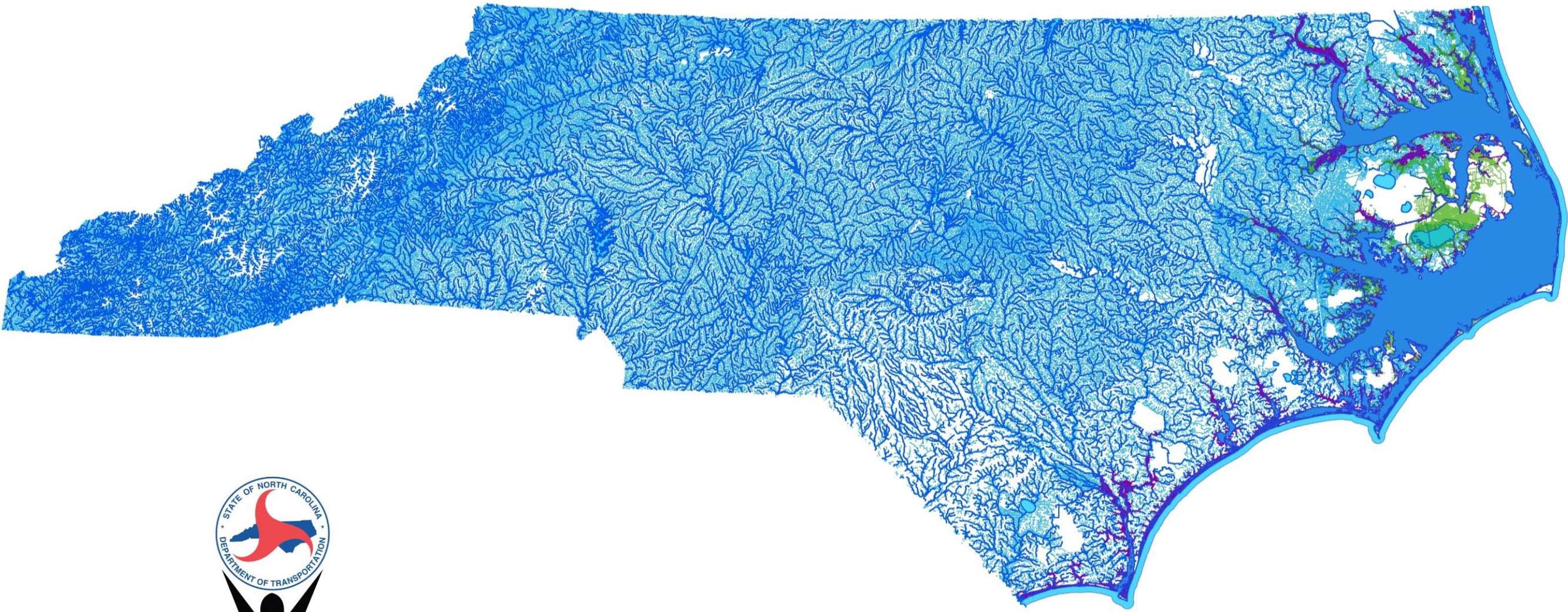


Cold
Cool
Warm



USACE Cold, Cool, Warm Water Habitat





ATLAS HYDROGRAPHY v1.0